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INTERNATIONAL COMPARISONS OF REAL PRODUCT, 1820-1990: AN ALTERNATIVE DATASET

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Abstract

In this paper a new set of current price estimates of per capita income, adjusted for each currency´s purchasing power, is presented for more than twenty countries over the last one and a half centuries. A short-cut method is used to derive current price comparisons for countries and periods in which aggregate PPPs are not available. Current price estimates of PPP-adjusted GDP appear to be more economically sound than constant price figures as economic agents react to current, not to constant, prices and, therefore, would allow us more appropiate cross-country comparisons of welfare and productivity. Moreover, the new estimates tend to mitigate the index number problem by rendering less remote benchmarks for constant price comparisons than widely used datasets at constant 1985 or 1990 "international" dollars. Country rankings in the new data set are different from those provided by earlier cross-country comparisons and among the new findings the earlier US leadership and the closer position of Britain and France over the long 19th century can be highlighted.

Keywords: Purchasing Power Parity; International Comparisons; Growth.

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Abstract

In this paper a new set of current price estimates of per capita income, adjusted for each currency's purchasing power, is presented for more than twenty countries over the last one and a half centuries. A short-cut method is used to derive current price comparisons for countries and periods in which aggregate PPPs are not available. Current price estimates of PPP-adjusted GDP appear to be more economically sound than constant price figures as economic agents react to current, not to constant, prices. and, therefore, would allow us more appropriate cross-country comparisons of productivity and welfare. Country rankings in the new data set are different from those provided by earlier cross-country comparisons and among the new findings the earlier US leadership and the closer relative position of Britain and France over the long 19th century can be highlighted.

Efforts to produce historical national accounts are now widespread throughout Europe and render data sets widely used in the years past obsolete. New historical comparisons of product per head across countries are, then, constructed by extrapolating present day levels of GDP backwards with growth rates calculated from national runs of GDP/GNP data deflated to yield series at constant prices[1]. It is the aim of this paper to provide revised estimates of, PPP adjusted, levels of output at current prices in order to represent a more economically sound alternative to the familiar constant price comparisons as cross-sectional comparability is improved[2]. It provides new evidence to inform the ongoing debate on catching up and convergence across countries over the last one and a half centuries. The estimates are certainly subject to margins of error but they are probably closer to "real" (PPP-adjusted) product per head than "nominal" (i.e. exchange rate converted) income and for many purposes are logically superior to the widely accepted figures for GDP *per capita* expressed in 1960, 1970 or 1990 dollars (Bairoch (1976, 1978); Maddison (1982, 1991, 1995)). My paper opens with a short survey of theoretical justifications for the PPP methods of adjustment in order to facilitate comparisons of GDP across countries. Then, the short-cut method to obtain PPP-adjusted per capita income is discussed. Section three applies the short-cut method to data in panel form for the years 1950-90. Section four includes a new historical dataset of PPP-corrected real product estimates and juxtaposes it with previous evidence so that the findings are place in the framework of previously constructed data sets. Finally preliminary inferences are offered in the conclusions[3].

I. Nominal Exchange Rates and the Purchasing Power Parities of National Currencies

Theoretical objections to the use of exchange-rate converted levels of per capita income can be traced back to Ricardo who attributed the higher price levels for non-tradeables in higher productivity countries to the efficiency of labour employed in their export industries and, he suggested, led, in turn, to higher wage levels throughout the economy (Viner (1937)[4].

Gilbert and Kravis (1954) answered the question of why conversions of national product by nominal exchange rates could be misleading by distinguishing between goods and services which are traded internationally from those which are not. Even for tradables, the equilibrium exchange rate is required because exchange controls, quantitative restrictions on trade and

devaluations made the unadjusted exchange rate unreliable[5]. Nevertheless, they stressed that it is the price relationship for non-tradables which departs fundamentally from the one given by the exchange rate, and pointed to differences in factor endowments and comparative advantage as its basic causes[6].

Balassa provided a most persuasive explanation for the failure of the exchange-rate converted income to provide a measure of a country's purchasing power: the theory of the productivity differential. As he observed:

> "The greater are intercountry productivity differentials in the production of traded goods (manufactured and agricultural products), *ceteris paribus*, the greater will be differences in wage levels. In the field of services, the productivity gap is considerably smaller, while wage increases in the tertiary sector (nontraded goods) follow wage movements in material production, especially industry. Consequently, nontraded goods will become relatively more expensive as development proceeds, and increased productivity differentials will be accompanied by an increasing degree of overvaluation of the per capita income of richer countries" (Balassa (1961: 395)).

Such a theory, anticipated by Harrod (1939), was further developed by Balassa (1964) and Samuelson (1964)[7]. The implicit assumptions of the theory are that the 'international' price of non tradeables is measured by the opportunity cost of the factors of production used to produce them in relatively high income countries and, secondly, that the constraints on the international mobility of labour keep the prices of nontradables below international levels (Isenman (1980: 62-65)). International price equalization in nontradables requires the migration of labour in response to intercountry differences in living standards (Balassa (1964); Hohonan (1998)).

Balassa (1964: 596) concluded that "the use of exchange rates as conversion ratios will overstate the GNP of high income countries and understate that of low income countries, with the degree of overstatement increasing as income levels rise". Although Balasssa's interpretation has been accepted in the empirical research programme of Kravis, Heston and Summers (1978a:9), several theoretical objections have been raised[8]. For example, the comparability of nontradables output across countries was questioned by Officer (1976a:575) who claimed that quality differences in nontradables are ignored in Balassa's model[9]. Balassa's proposition that the relative price of nontradables rises with per capita income, was contested by Clague and Tanzi (1972:4) who argued that it does not always hold if the model is

generalized to include human capital and natural resources. Lancieri (1996:269) challenged the existence of a single, homogeneous labour market within every country.

Finally, an alternative interpretation to the productivity differential has been provided by Kravis and Lipsey (1983) and Bhagwati (1984) who explained the relatively low price of nontradables in LDCs within the framework of a capital-labour model without assuming different production functions across countries[10]. In their view,

> "Service industries are relatively labour intensive, on average, in all types of countries (..). Because capital is abundant in rich countries, labour is highly productive and expensive. As a result, rich countries produce and export capital-intensive tradables to poor (labour-abundant) countries, and poor countries produce and export labour-intensive tradables to rich countries. Nontradables, however, must be produced by each country for its own use. Since services (nontradables) are labour-intensive and labour is expensive in rich countries, the price of services tends to be high in rich countries relative to the price of commodities, just as the price of labour-intensive goods is high relative to that of capital goods" (Kravis and Lipsey (1983:12-13).

Thus, for widely accepted and sound theoretical reasons conversions at nominal rates of exchange are not acceptable for purposes of comparing levels of output and welfare across countries[11]. Furthermore, empirical evidence gathered in recent years strongly rejects the conventional results obtained through the trading exchange rate converter (Summers and Heston (1991), van Ark (1993)), as trading exchange rates reflect only the purchasing power of goods traded internationally, and are influenced by capital movements, exchange controls and speculation (Maddison (1995:162)). In brief, trading exchange rates do not measure relative price levels and do not move with them overtime (Ahmad (1998)).

II. Comparisons Across Space and Time: A Short-cut Method.

For reasons briefly outlined in section one, the substitution of purchasing power parity rates of conversion for the accesible trading exchange rates has become common practice in comparisons of GDP across countries. Comparisons through time have been affected by the comparative approach developed by the World Bank and levels of product per person or per worker for years in the past are now expressed in present-day PPP-adjusted dollars. A series first published by Bairoch (1976) in 1960 dollars have been superseded as and when the International Comparisons Project (ICP) produced new PPP rates of exchange. Thus, in his

latest contribution, which includes a sample of countries with series covering nearly two centuries, Angus Maddison (1995) expresses the comparisons in 1990 "international" dollars[12]. Thus, the ICP demand-oriented program and, more recently, the International Comparisons of Output and Productivity (ICOP) group at Groningen have provided purchasing power parity adjusted exchange rates to convert GDP expressed in national currency into internationally comparable units of account (van Ark (1993))[13]. Both ICP and ICOP have concentrated their research on recent years and, only a few PPPs have been constructed for earlier periods, and mostly from the output side, with the exception of Williamson (1995) who used an income approach[14]. The reason for the dearth of PPP estimates for years before 1960 is the high costs in terms of time and resources involved in the construction of PPP converters (Ahmad (1998)). In addition, data for the pre-World War II era are scarce and unreliable.

Yet plausible estimates of GDP levels expressed in a common standard, unaffected by yearly disturbances in exchange rates and covering a large number of countries are a pre-condition for comparative economic history. Backcasting present-day PPP adjusted GDP levels on the basis of growth rates derived from national accounts data represents the most convenient alternative available to those who aim to conduct comparisons across space and time[15].

Unfortunately, by accepting a distant PPP as the point of reference, the procedure, as pioneered by Bairoch and Maddison, introduces distortions and ambiguities in inter-temporal comparisons. For example, estimates expressed in 1990 PPP-adjusted dollars allows for a comparison between the benchmark year (1990) and any other year within the observed time series (conducted in terms of a basket of goods weighted and priced according to the tastes and preferences of 1990), but the fixed, end year estimate does not in theory allow for a comparison between any other pair of years in the time span. Moreover, the validity and interest of the comparisons depends on how stable the basket of goods and services used to construct the original PPP converters remains over time[16]. Historically as growth occurs the composition of production, consumption and relative prices all vary, the economic meaning of comparing real product per head based upon remote PPPs becomes entirely questionable and it could happen that comparisons based upon PPP projections might generate larger errors than comparisons using conventional exchange rates [ER, thereafter] (Eichengreen (1986))[17].

Furthermore, the selection of a particular PPP benchmark converter produces worrying dispersion in relative income levels (Maddison (1991); O'Rourke and Williamson (1997))[18]. Short-cut solutions to the construction of PPP converters could, then, be a plausible solution to comparing income levels over space and time and might mitigate the formidable index number problem involved in conducting comparisons based upon data for a single benchmark year[19]. Short-cut methods involves regression analysis whereby the price level (i.e.PPP/ER ratios) or, alternatively, PPP-adjusted income per capita, is regressed upon exchange-rate converted product per head and a set of additional explanatory variables for a sample of countries for which PPP data happen to be available. Later, the established formal relationship is used to infer out of sample (countries and years) levels of real per capita product. The undelying hipothesis behind the short-cut approach is that a structural relationship exists between the price level and basic economic characteristics (Kravis and Lipsey (1987))[20].

Short-cut solutions to the problem of comparing GDP across countries were originally provided by David (1972), Clague and Tanzi (1972) and Kravis, Heston and Summers (1978b)[21]. Nevertheless the rationale behind the technique must be defended and elaborated further. Short-cut estimates can be based exclusively on the ER-converted income as the explanatory variable (David (1972, 1973); Balassa (1964, 1973); Huslman-Vejsova 1975)). Alternatively, the estimates could and should include additional variables to nominal income and, thereby, break the monotonic relationship between PPP-converted and ER-adjusted income by which two countries with identical nominal income per capita will have the same real income (Clague and Tanzi (1972); Kravis, Heston and Summers (1978, 1980); Isenman (1980); Summers and Heston (1984); Clague (1986a, 1986b); Ahmad (1996)).

In their seminal defense of the short-cut method, Kravis, Heston and Summers (1978b) [KHS, thereafter] stressed the existence of convergent and divergent forces affecting price relationships across countries[22]. In their view international trade leads, through competition, to the integration of markets which tends to equalize (commodity and factor) prices over time. Conversely, the isolation of national economies derived from geography, history and policies, prevents markets integration and so impedes price convergence. KHS posited a stable relationship between purchasing power parity- and trading exchange rate-converted income

conditional upon their degree of openness, relative to a "star" or reference country, in order to capture structural change. The ratio of exports and imports of goods and services to GDP was used by KHS as an indicator for openness. They expected that the more exposed an economy was to international competition, the narrower the differential between the PPP-converted and the ER-adjusted income would be while, conversely, the differential would widen for countries protected by location, high transport costs and impediments to trade imposed by governments[23].

As Kravis, Heston and Summers observed,

> "in the more exposed economy, a larger proportion of the commodities that enter final production are traded, and commodity prices are thus pulled closer to world levels. This raises factor prices in the commodity producing (traded goods) sector. As a result of the tendency towards factor price equalisation within the economy, it also increases factor prices in the non-traded goods sector (service and construction industries), and thus raises the final prices of such products" (KHS: 221). .

Dissatisfied with the theoretical foundations of openness as an explanatory variable, Clague (1985, 1986a, 1986b, 1988) argued that import restrictions are associated with higher price levels and, thus, the more open an economy, that is, the lower its import barriers, the lower its price level should be[24]. Kravis and his associates were aware that "a lack of openness due to protective commercial policies could lead to higher prices for traded goods" but they argued that the effect of protection on the aggregate price level is not clear as protection also would have a depressing impact on nontradables' prices, since tariffs or quantitative restrictions on imports shelter import-substituting industries (that is, tradables)[25].

Kravis and Lipsey (1987:100) qualified KHS earlier views by admitting that "trade not only operates directly in pulling prices of tradables toward greater uniformity but affects the price of non-tradables by tending to raise the price of relatively abundant factors" and the direction of the price level-openness relationship varies with factor proportions. Thus, in poor countries, where labour is the abundant factor, and being nontradables labour-intensive, the expected relationship would be positive, that is, *caeteris paribus*, more openness should be linked to higher prices. Whereas, in rich countries, the more open the economy the lower its price level[26].

Nevertheless it can be argued that that the views of Clague (1985, 1986a, 1986b) and Isenman (1980) can be reconciled with those of KHS and Kravis and Lipsey, which favour the use of the degree of openness as an explanatory variable of the PPP-ER differences. In fact, KHS and Kravis and Lipsey (1987) suggestion that a high foreign trade/GDP ratio reduces country-to-country divergence in price levels (that is to say, the more open an economy, the closer the PPP and the ER become), is not inconsistent with Clague's view that the expected relation between the price level (that is, the PPP/ER ratio) and openness could be negative. As an economy opens up, the PPP-ER differential narrows which means the national price level converges towards the international level and that tendency to converge could represent a fall in national price levels.

The ambiguity reflected in the expected sign of the relationship between the price level and the degree of openness led other authors to suggest replacing the explanatory variable used in the short-cut regression by less ambiguous variables[27]. Attempts to provide alternative explanations for the determinants of the PPP-ER differentials generated more explanatory hipotheses. For example, Clague and Tanzi (1972:4) assumed that commodities (tradables) are more natural-resource intensive that services (nontradables) and argued that, *caeteris paribus*, the relative price of services will be higher in a resource-rich country, and Balassa (1973:1264) provided the rationale for it, "as non-traded goods use relatively small amounts of natural resources, their relative price will tend to rise with per capita endowments in these resources". Clague (1985, 1986a) also showed an association between the trade balance and the price level. Other things being equal, a higher price level corresponded to a trade deficit because a "transfer [resulting from a current account deficit] can be thought of as an increase in national expenditure while national income is held constant" and such "inward transfers pull labour out of tradables into nontradables, lowering the marginal costs and relative price of commodities" Clague (1986a:321)[28].

Isenman (1980), Clague (1986b) and Ahmad (1996) put forward the hypothesis that when services are skill intensive, higher schooling leads to a lower price for services and, consequently, to a lower price level. Their rationale asserts that while differences in nominal per capita income are acceptable as proxies for price differentials in non-skilled services and

construction, skilled nontradables -due to large differences in the skilled labour supply- are best proximated by some human capital indicator and the secondary school enrollment ratio is their favourite specification[29]. Education can also be represented, as an income-elastic good. Hence, the educational level along nominal income helps to predict real income[30].

Given the theoretical foundations for the short-cut approach to derive PPP rates of exchange, the challenge for economic historians is to explore the way in which such methods might be applied to derive real income levels for times past. Eichengreen (1986) proposed that historians should adopt the method KHS used to obtain PPP-adjusted real income for non-benchmark countries in their cross-sectional dataset, to derive comparable levels of GDP per head. Such an approach has the advantage of generating cross-country comparisons of real product at current prices. Thus, it provides a more acceptable economic depiction of a country's relative position in the world than conjectural numbers based upon PPP converters for remote years. After all people live in terms of and react to current not to constant prices. Nevertheless the method rests upon a debatable assumption about the extent to which a structural relationship found between the price levels and a series of explanatory variables (including the nominal income) for the late 20th Century can be projected backwards in order to derive plausible conjectures of relative levels of GDP for earlier periods of history[31]. Arbitrary as they are, the assumptions involved in short cut estimation methods seem more acceptable than the assumption of no structural change over time implicit in the familiar backward projection of PPP-adjusted levels of present-day estimates of GDP to the past.

III. Regression Analysis.

In this section Eichengreen's suggestion will be taken up. The variables selected and used derive from contributions to the debate on short-cut estimates of real income. My estimation procedure aimed at establishing a structural relationship, for each country, between its price level (thereafter, PL, defined as the PPP/ER ratio), on the one hand, and nominal GDP per head (expressed into US dollars using the trading rate of exchange), plus an additional set of explanatory variables, on the other. Parameters from the resulting equation will be, then, used together with the values from each independent variable to derive PLs for non-benchmark countries (i.e. out of sample years and countries). Then, a new set of real income estimates in

current prices will be obtained by deflating levels of nominal GDP per head by the PL. It amounts to divide levels of GDP per head, expressed in each country's own currency [Y], by the estimated PPP. That is, (Y/ER)/PL=(Y/ER)/(PPP/ER)=Y/PPP.

For the dependent variable, either the price level (PL) or the level of real product per head (PPP-adjusted), expressed relative to the US, can be selected. The first option is widely seen as the better choice and I decided to concentrate on the determinants of the PPP-ER ratio[32]. Some elaboration on the type of PPP chosen as the numerator of the dependent variable (PL=PPP/ER) seems necessary.

Binary versus multilateral approaches to cross-country comparisons come into the discussion when short-cut methods are used to produce historical estimates of real GDP. Transitivity and characteristicity conflict in PPP comparisons, and they represent a trade off between binary and multilateral approaches to PPP (Dabán, Doménech and Molinas (1997))[33]. Thus, the lower the number of countries and the more homogeneous their expenditure patterns, the stronger will be the appeal of a binary approach. Characteristicity in this case will prevail despite the fact that comparisons among countries can only logically be carried out through each country's binary comparison to the reference country (usually the US), and the results are not transitive.

In practice, the binary approach dominates most ICOP papers and pre-World War II studies, including Maddison's own (1982, 1991) long run comparisons. Furthermore, despite failing to satisfy transitivity, additivity and country invariance conditions, PPPs obtained through the binary approach provide a more clear economic meaning than multilateral methods[34]. In the present case, a sample of countries from Europe and European off-shoots overseas (plus Japan) is considered. As Maddison (1982) pointed out, they are nations that tended to converge towards the star country's (the U.S.) patterns of demand and productivity. Moreover, data availability favours the choice of a binary approach because PPPs for 1950 were derived through the binary method (Gilbert and Kravis (1954); Gilbert and Associates (1958)). The adoption of the more theoretically correct multilateral approach would confine all the useable information to the post-1970 period.

The ICP convention is to define Laspeyres and Paasche binary indices by regarding the higher income country in any pair of countries, as the base situation. That is, when the basket of

goods used to compare two countries corresponds to the star country (i.e., the US), a Laspeyres purchasing power parity exchange rate will be computed (as a ratio of the aggregated value of the US basket expressed at each country's own prices to one valued in US prices). If, instead, the basket for the non-star country is considered, then, a Paasche PPP will be obtained. In turn, it means that when any country's GDP, expressed in national currency, is converted into a common currency (US $) through a Paasche PPP, a Laspeyres value index will result[35].

In fact, only when Paasche PPPs are chosen and, therefore, Laspeyres value measures are obtained (that is, when GDP is estimated at US relative prices for the whole set of countries), transitivity will be kept within the star-country system (Kravis (1984:8-10)[36]. David favoured the use of a uniform set of prices when time series and cross-section data are pooled, and noted that,

> "the uniformity of the direction of the expected bias present in Laspeyres quantity comparison between all possible pairs of countries (..) can be guaranteed by selecting the uniform price weights from the country which is situated at the upper extreme of the range of real per capita incomes" David (1973:1269).[37].

Moreover, binary PPP-converted GDP estimates do not suffer the incomparability problem of the multilateral approach that emerges when country coverage changes over time, since a set of countries is compared simultaneously (i.e. multilaterally) and, therefore, the addition or deletion of countries alters the relationship between any pair of countries (Ahmad (1994:57-60)).

Finally, the Laspeyres PPP-converted real product (that is, real GDP obtained through a Paasche PPP), is the binary comparison that comes closest to the multilateral Geary-Khamis PPP-converted per capita GDP since, in the latter, countries are weighted according to size. However, both Paasche and Geary-Khamis PPPs tend to be vulnerable to the substitution bias or Gerschenkron effect, that is, the tendency for the quantity index to be lower the higher the correlation between its own price structure and the price structure used for valuation. The reason for it is that valuation by a country's own prices leads to a lower aggregate valuation of its GDP because the set of quantities produced has adapted to this set of prices. As Kravis

(1984:9) observed: countries tend to consume relatively more of those goods for which prices are relatively low[38].

My selection of independent variables presupposed explanatory potential and data availability for some 20 countries covering a time span of one and a half centuries. Along with the nominal per capita income, the degree of openness, the current account balance, skills and natural resource endowments have been considered, in proximated form, as regressors, since data are widely available after 1913 and, for most advanced countries, for decades before World War I[39]. Brief comments on each variable including its expected correlation with the price level will be necessary before presenting the results from the econometric exercise.

First, nominal GDP per head is assumed to capture the price level in the tradable sector of the economy. Chart 1 shows how closely manufacturing wages, which condition tradable prices, correlate with nominal income, a trend close to 45 degree can be noticed but with a higher dispersion at lower levels of wages[40]. Wages in the tradables' sector really matter because, given internal mobility of labour (and restrictions to external mobility), they also affect wages in nontradable production and, consequently, the price level for nontradables and, in turn, the aggregate price level. A positive correlation between nominal per capita income and the price level should be expected. Charts 2 and 3 support this hypothesis but the evidence also points to a more than proportional increase in the price level as nominal income rises, which is, however, more evident in the case of the Paasche- than of the Laspeyres price index.

Secondly, differences in skills among the labour force employed in services across countries will be proxied by two indicators: primary and secondary school enrollment and by the years of education received per person over 25 years of age. Since at higher levels of skill services will become more efficient, *caeteris paribus*, it will be presumed that skills will have a negative correlation to prices paid for services and, consequently, to the aggregate price level (Isenman (1980); Clague (1986b)).

Thirdly, because natural endowments are mostly embodied in tradables, nontradable prices should rise in resource abundant countries and, therefore, increase the aggregate price level. Hence, a positive relationship between resource abundance and the price level can be expected (Clague and Tanzi (1972); Clague (1988); Dollar (1992)). Both agricultural land per person

and the ratio of country's physical size to its population (that is, the inverse of population density) have been used as proxies for this variable[41].

Fourthly, capital inflow is proximated by the current account balance (with changed sign), and because a net inflow of capital represents an increase in expenditure while domestic output is held constant, *caeteris paribus*, the expected relationship should be the larger the current account deficit (i.e. the capital inflow), the higher the price level (Clague (1986a)).

Finally, the degree of openness, that is, the ratio of commodity exports and imports to GDP, will also be tested and it is included on the grounds that the variable captures structural change overtime[42]. Thus, a negative relationship between openness and the price level can be predicated (Clague (1985, 1986a)), although it could be argued that, in addition to equalising the prices of tradables, trade raises the price of abundant factors and, thus, affects prices of nontradables. Hence, the direction of the relationship between openness and the price level will depend on whether capital or labour is the relatively abundant factor (Kravis and Lipsey (1987))[43]. Nonetheless, it could be argued from the characteristics of the sample of countries included (mainly post-World War II western nations), that the expected relationship would most probably be negative.

All available, directly computed, PPPs have been included in the regressions, including calculations for 1950 by Gilbert and Associates (1958), and for 1967-1990 by ICP (from rounds I to VI, covering a growing sample of countries, at five year intervals, for 1970-90, together with evidence for 1967 and 1973)[44]. The countries considered include all OECD members for which benchmark estimates were derived, together with Argentina, an "area of new settlement" that completes a group of comparable countries: Australia, New Zealand, and Canada (Table 1). My choice was to restrict the sample size so that differences in economic organisation and culture were kept to a minimum, even though, income, climate, and dependence on trade varied significantly across the sample.

Estimates have been carried out for each benchmark's sample. Then, the data for all benchmark years have been pooled with a dummy variable for each benchmark in an attempt to identify time effects. Short-cut estimation pools different cross-sections and thus allows for changes in the relationship between the price level and nominal per capita income over time[45].

Estimation with panel data techniques has the advantage of increasing the degrees of freedom and, therefore, the robustness of the resulting parameters[46]. Finally, the goodness of the fit and the stability of parameters over different specifications were the criteria used to choose the preferred set of equations.

Alternative especifications have been carried out as an initial stage in making short-cut estimates, by using as regressors the relative nominal income and only one of the variables selected to account for the behaviour of nontradable prices. Natural endowments and labour skills turned out to be not significant and were, consequently, discarded. In the case of natural endowments, proxied by hectares of agricultural land per person, a positive, though not significant, relationship with the comparative price level was confirmed (another proxy variable, the inverse of the population density proved even less significant). Educational attainment (average years of schooling per person over 25 years), showed a negative relation with the price level, as hypothesised, but the relationship was not significant. A strikingly positive (and even less significant) relationship to the price level was found for school enrolment (primary and secondary students over population aged 5-19).

For the capital inflow and the degree of openness a statistically significant association with the price level (both isolated and interacting with each other) was found, positive for capital inflow and negative for openness. Thus, in all cases, the hypotheses about some measure correlation with the price level were confirmed but only for capital inflow and openness were the results statistically significant. Thus, these two variables were included along with nominal per capita income into the short-cut equations. The equations finally chosen are as follows:

$$\ln (PL)_{ij}=a_1\ln(RXRY_{ij})+a_2(\ln RXRY_{ij})^2+a_3(\ln ROPEN_{ij})+a_4(\ln ROPEN_{ij})^2+TD_i \qquad [I]$$

$$\ln (PL)_{ij}=a_1\ln(RXRY_{ij})+a_2(\ln RXRY_{ij})^2+a_3(\ln ROPEN_{ij})+a_4(\ln ROPEN_{ij})^2 +a_5(RTCABAL_{ij})+TD_i \qquad [II]$$

where **PL** is the price level, that is, the ratio of the Paasche[47] PPP to the trading exchange rate (ER) for each country **j**; **RXRY** is GDP per head, converted into dollars at the trading exchange rate; **ROPEN** represents commodity exports and imports as a ratio to GDP, measured at current prices; **RTCABAL** is the the current account balance expressed as a percentage of GDP, and **TD** represents the time dummy for each benchmark **i**. All variables in

the regresion have been expressed relative to the US. and transformed into natural logarithms (except **RTCABAL**) in order to improve the fit on the data.

In addition to a variable expressing each country's relative degree of openness in logs, I added its quadratic form. Following KHS, I also included also the quadratic term for the nominal income. This adoption of a non-linear form attempts to capture a relationship that fades away over time, and acknowledges a certain threshold above which increases in the independent variable have a diminishing effect on the dependent variable.

Time dummies improve the fit of the equations only for the sample period, but not for out of sample years, and since the resulting paramaters from equations [I] and [II] will be used to derive price levels for out of sample (pre-1950) years, new regressions have been run for more simplified specifications in which time dummies for each benchmark were omitted. The simplified specifications provide an additional test for the robustness of the independent variables. Two different specifications were tried: firstly, time dummies were excluded and, secondly, only a time dummy for alternative monetary regimes, **DAMR**, was used that takes value 0 for the Bretton Woods era (1950-70) and value 1, thereafter (1970-90. The **DAMR** dummy could be seen as a compromise for the out-of-sample years since from the exchange rate point of view, the Bretton Woods epoch has been associated to the Classical Gold Standard era and the post-Bretton Woods years might be an acceptable aproximation for the Interwar years[48]. Thus, DAMR takes the value 0 for the decades prior to World War I and the value 1 for the period 1920-38. Nevertheless, as can be observed in Table 2, which reports regression results obtained through ordinary least squares (OLS), the alternative set of simplified equations do not cast significantly different results and I have opted for those specifications which include time dummies for each benchmark as they present the best statistical fit.

Price levels (PL) were obtained by applying the parameters obtained from equations (I) and (II) above (Table 2) to the value of each independent variable. A new set of (Laspeyres) levels of real product per head at current prices were computed by deflating levels of nominal GDP per capita (i.e. converted into dollars through the trading exchange rate) with the estimated (Paasche) PLs[49]. Although two alternative sets of PL estimates are available, those resulting

from equation (I), which includes capital inflow, are the prefered set. Estimates for countries missing from the data derived from equation (I) have been replaced with figures derived from equation (IV) which is less demanding of data and has a wider coverage of data for the pre-1950 period (Tables 5-6).

Users of these new estimates for comparative income levels should be warned about extrapolations to non-benchmark countries:

"on average, the short-cut estimates ..come closer to the truth than exchange-rate conversions..The difficulty is that the margins of error .. still create a degree of uncertainty about relationships among individual countries that may be deemed unacceptable for some operational purposes (Kravis (1984:18))".

The purpose of the short-cut method is to provide conjectures of deviations between PPPs and known ERs. Errors of measurement reside in these deviations. Fortunately, some measure of those errors can be computed when the estimating procedure for non-benchmark countries is applied to benchmark countries presented in Table 1 and the forecasted results compared to the actual ones (Summers and Heston (1984:218)). In Table 3 an attempt has been made to produce estimates of forecasting errors by computing the mean absolute error and a measure of the deviation of the simulated variable from its actual time path, the rms (root-mean-square) error. A simulation statistic related to the rms error, the Theil's inequality coefficient, that falls between 0 (perfect fit) and 1, is also provided that, in turn, can be decomposed into proportions of systematic error (bias), ability to replicate de variability of the dependent variable (variance) and unsystematic error (covariance). In all measures, the smallest forecasting errors are those found for equations I and IV.

The main difficulty and potential source of error does not, however, reside in the short-cut approach but in the application of a structural relationship derived from advanced western economies over the last fifty years to earlier and different historical contexts even for the same group of countries[50]. Some historians would not regard this kind of long run extrapolation acceptable. Indeed both the size and the sign of the parameters can be questioned particularly for the less developed countries of the European Periphery where, before 1913, trade apparently operated to raise wages for the nontradable sector (that is, the sector which made intensive use of the abundant factor, labour) increasing, consequently, nontradable prices and,

in turn, the aggregate price level. If this view is correct, then, the extrapolation of a structural relationship for post-1950 advanced nations to the developing countries of the European Periphery prior to say 1929 or 1913 could be misleading because there might have been a positive association rather than a negative association between openness and the price level. In that case, the relative position of the more open peripheral economies of the 19th and early 20th centuries would have been overestimated by the real income estimates derived from the short-cut equations, while the opposite would hold for closed economies[51].

IV The New GDP Data Set: Some Implications.

Table A.1 in the Appendix presents levels of product per head relative to the US for conventional historical dates, alongside price levels, as measured by PPP/ER ratios, while the mean from the absolute value of the deviations of the alternative estimates of product per head to the actual ICP values is presented for each benchmark in Table 4. It can be noticed that my new estimates cast the lowest deviations with the only exception of those for 1975[52]. Since it could be claimed that the discrepancies across datasets can be attributed in part to the inclusion of improved data in the latest estimates (including Argentina, Austria, Belgium, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Portugal and Spain) Maddison (1995) figures have been revised to incorporate the latest GDP data available, matching the country data used in my new estimates[53]. The complete new dataset of real product per head at current prices (relative to the US) for more than 20 countries over 1820-1990 is displayed in Table 5. Perhaps the best way of drawing some preliminary inferences from the new dataset is to compare it against available (PPP-adjusted) GDP estimates produced by Bairoch (1960) in constant 1960 dollars, by Maddison (1995) in 1990 dollars, and with estimates in current dollars derived from trading rates of exchange, the alternative country rankings ordered from the highest to the lowest income level appear in Table 6[54].

Clearly, country rankings vary according to the data set selected to carry out international comparisons. Yet, there are several correlations across datasets that persist over time. Top and bottom countries in the ranking remain roughly the same on all the estimates. The favourable position of countries in the "areas of new settlement" and the backward position of countries located along the geographical periphery of Europe (to the south and the east) remain at least

till 1939-45. The advantage of countries in the New World over Europe in the 19th and early 20th centuries suggests that high land-labour ratios prevailed over gains from structural change derived from the first industrial revolution. The resource-abundant countries benefited from institutional restrictions on trade and factor mobility during the first half of the 20th century (Nelson and Wright (1992); Broadberry (1997a)). Besides, labour-intensive countries in Southern and Eastern Europe remained relatively backward while the internal differential between south and east appears to be relatively stable over the long run.

But what differences can be observed between the new and the older estimates?. In the first place, US leadership seems to have emerged earlier. Measured in per capita income (adjusted for its purchasing power) and at current prices, America was already ahead of the western world by the mid-19th century, in particular since 1880. Furthermore, the overall superiority of areas of new settlement is less discernable even though their privileged position is still there. Thus, US comparative advantage based upon an intensive use of natural resources (Wright (1990)) together with shifts of resources away from agriculture (Broadberry (1997a)) seem to be the clues for the US overtaking the UK. These features and its large market size help to explain American success among resource-abundant countries. This finding is congruent with Bairoch's numbers for the post-1880 period, but is at odds with Maddison's figures which show the US behind the UK (and Australia and New Zealand) until the eve of World War I.

My new estimates suggest that while the UK had already fallen behind the US by mid-century its relative position was, in turn, closer to that of France. In the late nineteenth century, French real income was above Germany's. According to my new estimates, the French product per head moved from 19 per cent below the UK level in 1880 to a differential of a mere 8 percent on the eve of World War I, when its real income stood were 8 per cent above the German level. The estimates question more pessimistic figures offered by Bairoch, Crafts (1984a) and Maddison, and provides qualified support for the revisionistic picture of two distinct but comparable paths to 20th century drawn by O'Brien and Keyder (1978)[55]. Despite the upward adjustment of 19th century Germany's income level (introduced to allow for the fact that German national accounts are expressed net and not gross) this country does not retain the relative per capita income to the US shown in Maddison's dataset[56]. Germany does display,

however, a clearer tendency to catch-up with the UK than in earlier estimates (including those of Crafts (1983) and Fremdling (1991)). Its per capita income rises from about sixty percent of UK income in mid-19th century to about 85% by 1913, a trend which is in clear contrast with the performance of Belgium and the Netherlands over the late 19th century.

As regards the Periphery if, instead of the present time description, a wider and more geographical definition of Peripheral countries is accepted in which reaching half the US income per head is the threshold, it appears that the differences between Scandinavian and Latin countries emerged during the late 19th Century as posited by O'Rourke and Williamson (1997). The new evidence suggests that the Maddison (1982, 1991) sample of 16 or 17 Core countries went through a long selection process before its superior position became unchallenged. By mid-19th century differences in real income between Scandinavian (excluding Denmark) and Latin or Central European countries were narrow. A widening gap between Scandinavia and Southern Europe appeared by the turn of the century with Norway and Sweden catching-up with an enlarging Core (Graph 1). In the eve of the Great Depression only Finland and Italy were still part of the Periphery among Maddison's advanced seventeen and it was not until the mid-1960s that the European Periphery as we know it today was settled.

As they stand, the differences between new and earlier real income estimates are accounted for by the variations in price levels shown in Table A.1. Thus, my new dataset suggests that, relative to the US, price levels in Australia and New Zealand, in the UK and Germany, and in Belgium and the Netherlands were, in fact, higher than those implicitly assumed in Maddison's well known estimates. This observation raises the central question explored in this paper: which of the several datasets currently available for purposes of international comparisons of productivity levels and standards of living is the most reliable?. The answer must reside to a considerable degree in comparative price levels. PLs are a rising function of the stage of development (Summers and Heston (1991)), and market exchange rates tend to exaggerate the price levels for low income countries. In fact, the new PLs show that this was generally the case. Although higher price levels in the Americas and Oceania are probably related to labour[57]. While trade barriers help to explain relatively high price levels in some Peripheral countries[58].

Furthermore, a closer look at implicit PLs in Maddison's estimates is instructive. For example, over the years 1850-1913, the UK price level remains, on average, at 75% of the US price level. Maddison's observation is clearly at odds with the new evidence (4% above the US on average), that shows a decline in the British price level from 12 percent above, to 11 percent below the US level. The stable and significantly lower price level in the UK, as presented in Maddison's estimates, does not seem to be a plausible outcome during a period of commodity and factor price convergence and the rise of American leadership. Moreover, it is also quite unlikely that the commercial exchange rate and the PPP for the two most advanced, open economies as the UK and USA were so far apart under the Classical Gold Standard. It can be argued, against this view, that the UK was a free trader whereas the USA was a protectionist country which would explain the high price differential between the two countries over the nineteenth century. A wider approach of protection taking into account not only barriers to commodity trade but also the lack of restrictions to inter-continental flows of labour and capital, would depict the US much more integrated in the global Atlantic economy.

Some of the differences between new and older data sets can be attributed to the fact that these comparisons are between estimates expressed in current and constant prices, respectively. Different representations certainly occur from comparisons in constant prices[59]. Computations at constant price of GDP levels with a fixed PPP-converted benchmark on the basis of the best available data are required to show the extent to which differences in older and more recent estimates of GDP do change the inferences drawn from current price estimates compared to datasets produced by Bairoch and Maddison. In Prados de la Escosura (1998a), the relative positions of countries to the UK are provided, for example, at constant 1913 US relative prices for 1820-1913, obtained by projecting backwards from the new benchmark of 1913 real per capita income using growth rates derived from deflated national accounts. A comparison between current and constant price estimates shows that while, at current prices, the US was already in front at mid-19th century, in 1913 dollars, the US only moved ahead the UK after 1900. The fact that the US economy grew faster than the UK's in the late 19th century, helps to explain that, at constant prices, the comparison points to a reduction in the gap between the two countries with an improvement for the UK's position.

Thus, the relative position of countries in these league tables depend upon both price and quantity. While the literature on international comparisons of income has concentrated mostly on the quantity effects by utilizing a fixed PPP-converted benchmark for GDP levels and backcasting with growth rates derived from national accounts, very limited attention has been paid changes in the price levels of countries despite the fact that inconsistencies in rankings have been frequently pointed out for the results of succesive ICP rounds.

V. Final Remarks

In this paper I have constructed a set of per capita GDP estimates at current prices, converted into common currency units and adjusted for differences in purchasing power of national currencies for more than twenty nations going back to 1820. These numbers were obtained through a short-cut method designed to derive levels of income for countries and periods for which aggregate PPPs are not yet available. My results are offered as more economically sound than earlier estimates expressed in present-day constant dollars. They should allow far more statistically secure comparisons of real income and productivity levels across countries. Alongside space comparisons, the new estimates render less remote benchmark comparisons over time than widely used estimates in 1960, 1970 or 1990 "international" dollars. Nonetheless, data are subject to a continuous process of refinement and improvement as the pioneering contributions by Bairoch and Maddison show, and the new dataset is only another step to produce acceptable and comparable estimates of real product across countries and over time, a precondition for comparative economic history that, then, might be able to move from arguments about "facts" to inferences and explanations of the relative positions of nations.

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Table I

Available PPPs by Benchmark Years and Country, 1950-1990

	1950	1967	1970	1973	1975	1980	1985	1990
Argentina						x		
Australia							x	x
Austria					x	x	x	x
Belgium	x		x	x	x	x	x	x
Canada		x				x	x	x
Denmark	x				x	x	x	x
Finland						x	x	x
France	x		x	x	x	x	x	x
Germany	x		x	x	x	x	x	x
Greece						x	x	x
Ireland					x	x	x	x
Italy	x		x	x	x	x	x	x
Japan		x	x	x	x	x	x	x
Netherlands	x		x	x	x	x	x	x
New Zealand							x	x
Norway	x					x	x	x
Portugal						x	x	x
Spain					x	x	x	x
Sweden							x	x
Switzerland								x
Turkey							x	x
United Kingdom	x	x	x	x	x	x	x	x
USA	x	x	x	x	x	x	x	x

Sources: 1950, Gilbert and Associates (1958), Table 5; 1967, Kravis, Kenessey, Heston and Summers (1975), Tables 13.12 and 13.14; Canada for 1965, from West (1967); 1970-1973, Kravis, Heston and Summers (1978a), Ch. 5; 1975-1990, ICP PPPs in Maddison (1995), Tables C-2 to C-6.

Chart 1. Nominal Income and Wages
(in logs) [US=1]

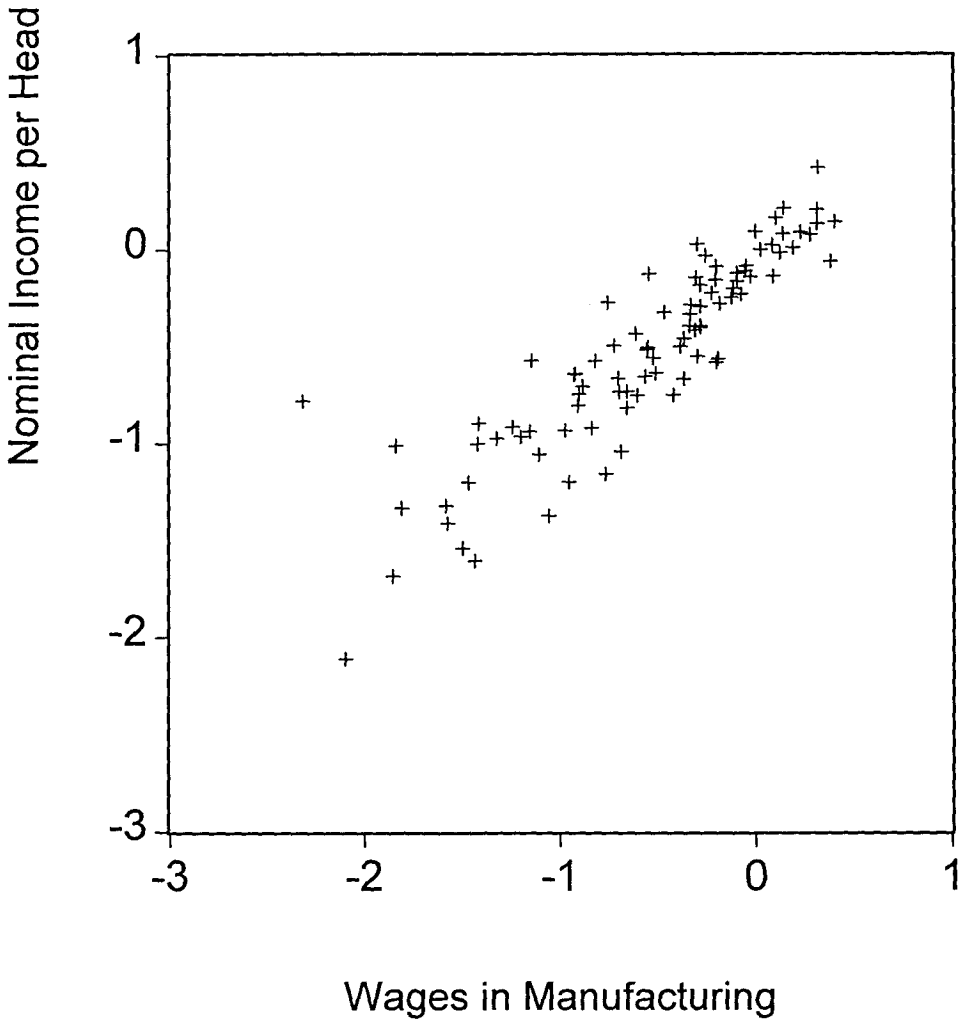

Chart 2. Paasche Price Level and Nominal Income
(in logs) [US=1]

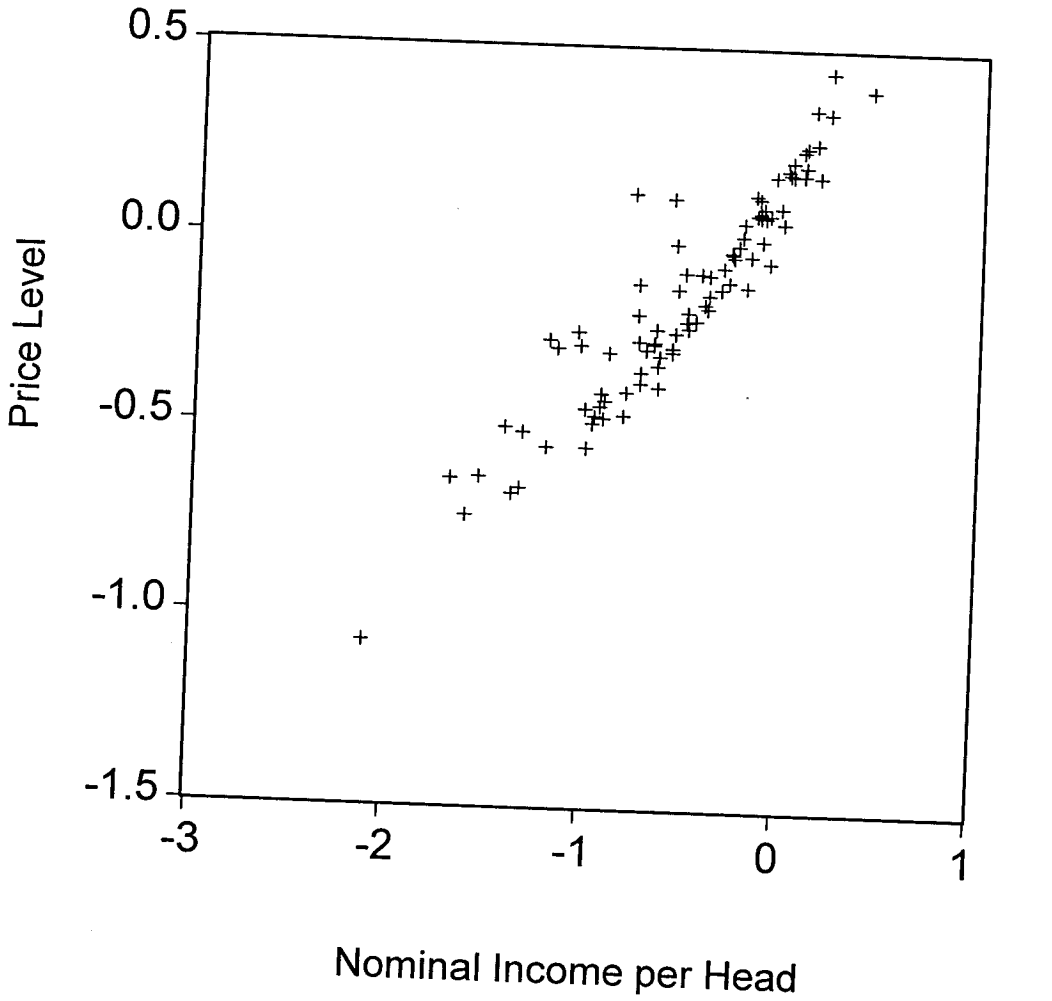

Chart 3. Laspeyres Price Level and Nominal Income

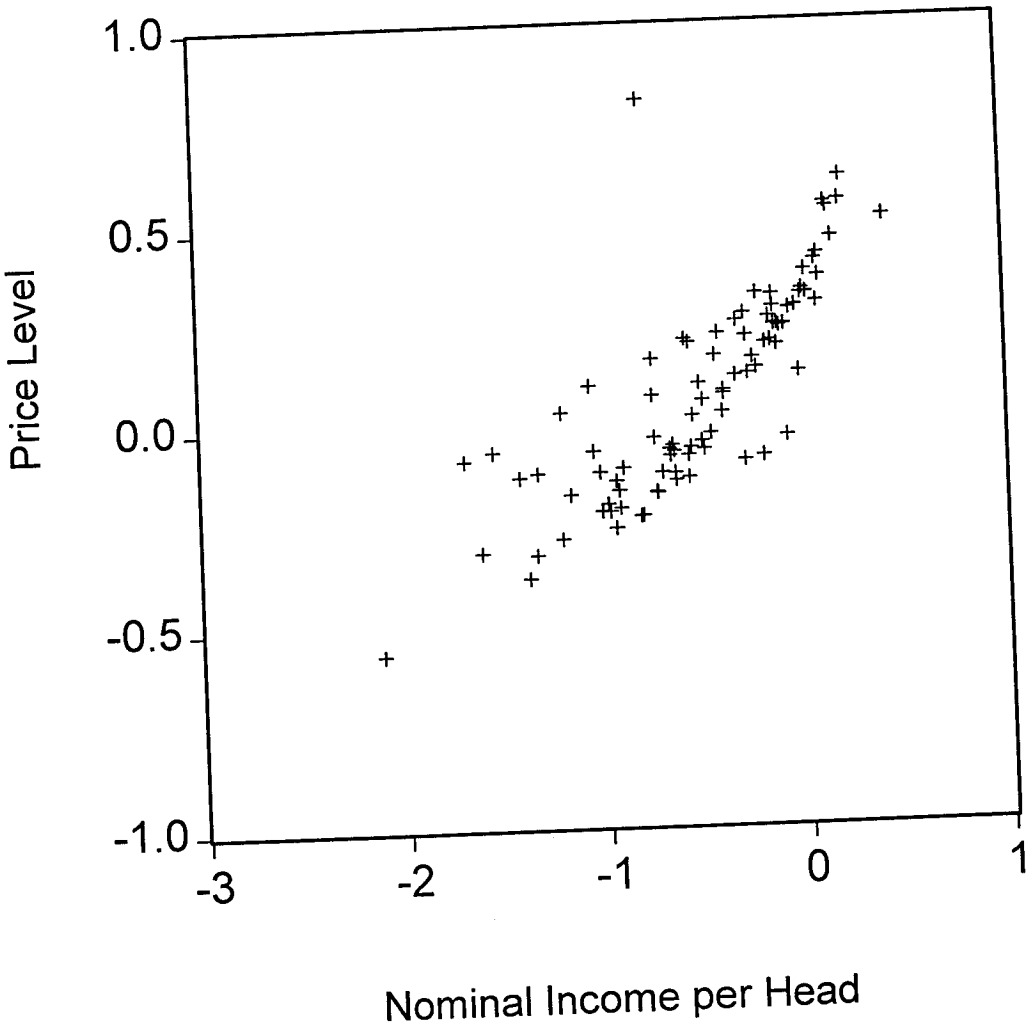

Table 2

Regression Results
(Estimation method: OLS)

Dependent variable: Paasche Price Level (PPP/ER ratio)
(Heteroskedasticity-consistent standard errors and covariance)

	Equation (I)	Equation (II)	Equation (III)	Equation (IV)	Equation (V)	Equation (VI)
Constant	0.2039 (0.0672)	0.2525 (0.0580)	0.1916 (0.0691)	0.2361 (0.0778)	0.2748 (0.0680)	0.1967 (0.0777)
RXRY	0.5253 (0.0175)	0.5474 (0.0181)	0.5354 (0.0207)	0.5258 (0.0188)	0.5456 (0.0185)	0.5309 (0.0215)
ROPEN	-0.1759 (0.0999)	-0.1840 (0.0897)	-0.1783 (0.0921)	-0.2040 (0.1155)	-0.2081 (0.1055)	-0.1980 (0.1069)
ROPEN2	0.0616 (0.0358)	0.0563 (0.0333)	0.0587 (0.0337)	0.0710 (0.0412)	0.0646 (0.0388)	0.0666 (0.0388)
RTCABAL	-0.0010 (0.0002)	-0.0009 (0.0002)	-0.0008 (0.0002)			
DAMR			0.0541 (0.0274)			0.0679 (0.0270)
TD1970	-0.0797 (0.0227)			-0.0965 (0.0228)		
TD1990	0.0978 (0.0250)			0.0827 (0.0255)		
Observations	93	93	93	93	93	93
Adjusted R^2	0.9306	0.9105	0.9133	0.9187	0.9013	0.9061
S.E. regression	0.0838	0.0952	0.0937	0.0907	0.1000	0.0975
Durbin-Watson stat	2.0443	1.6827	1.7190	1.9823	1.7492	1.7822
F-statistic	206.7	235.0	194.9	209.0	280.9	223.0

Notes: Standard errors in brackets (White heteroskedasticity consistent).
All variables, except **RTCABAL**, expressed in natural logarithms. **RXRY** is GDP per capita converted into US dollars at the trading exchange rate, **ROPEN** is the openness ratio (ratio of commodity exports and imports to GDP) and **RTCABAL**, the current account balance as percentage of GDP. All of the above are relative to the USA. **RXRY2** and **ROPEN2** are expressed in quadratic terms. **DAMR** is a dummy variable for alternative monetary regimes, taking value 0 for the Breton Woods era and value 1 otherwise. **TD1970** and **TD1990** are time dummies for 1970 and 1990.

Table 3

Forecast Evaluation of the Regression Results

	Equation (I)	Equation (II)	Equation (III)	Equation (IV)	Equation (V)	Equation (VI)
Root Mean Squared Error	0.0806	0.0926	0.0907	0.0878	0.0979	0.0949
Mean Absolute Error	0.0644	0.0712	0.0682	0.0715	0.0784	0.0743
Theil Inequality Coefficient	0.1133	0.1307	0.1278	0.1236	0.1383	0.1340
-Bias proportion	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-Variance proportion	0.0168	0.0224	0.0214	0.0200	0.0251	0.0235
-Covariance proportion	0.9832	0.9776	0.9786	0.9800	0.9749	0.9765

Sources: Table 2.

Table 4

Relative GDP per Head: Average Absolute Deviations from ICP Estimates*

	Exchange Rate	Bairoch	Maddison (R)	Prados
1950	0.51	0.11	0.13	0.08
1970	0.36	0.16	0.09	0.04
1975	0.17	0.29	0.04	0.06
1980	0.19	-	0.06	0.06
1985	0.39	-	0.10	0.07
1990	0.22	-	0.04	0.08

* USA=1.
Sources: Table A.1.

[1] PPP is defined as the number of units of a country's currency required to purchase the same amount of goods and services in the country as one dollar would buy in the US (Ahmad (1994: 54). The PPP concept has two versions. One is a conversion factor to transfer data from one currency into another, and this paper deals with it. Another aception refers to the PPP theory of exchange rates, which in its strong version asserts that the equilibrium exchange rate equals the ratio of domestic to foreign price levels, while in its weak form relates only to changes in both variables. Cf. Officer (1982) and Rogoff (1996).

[2] In doing so I hope to contribute, in the domain of historical statistics, "to fill, in an approximate way, a gap arising from the absence of comparative data on 'real' GDP per capita" (Kravis, Heston and Summers (1978b:215)).

[3] A more detailed analysis of the results and its implications for growth and catching up is presented in Prados de la Escosura (1998a).

[4] Cited by Kravis, Heston and Summers (1978b).

[5] Tariffs and transport costs would add to the differences between internal prices and exchange rates across countries which differ furthermore when prices for final consumers are taken into account since indirect taxes, distribution costs, etc. are different for each country.

[6] Gilbert and Kravis (1954) made clear that the purchasing power equivalents PPPs they computed should not be taken as the equilibrium exchange rate and, therefore, no conclusion about the under- or over-valuation of a given currency relative to the dollar can be derived.

[7] Balassa expressed it in five points,

a) the exchange rate will equate the prices of tradables if allowances are made for transport costs and no trade restrictions occur.
b) wage differentials in the tradable sector will correspond to productivity differentials (when prices equal marginal costs), while internal labour mobility will tend to equalize wages for similar skills within each economy.
c) given smaller productivity differentials in non-tradables, and that wages equalize within each country, non-tradables will be relatively more expensive in higher productivity countries.
d) since services do not affect directly the ER but only the PPP, the purchasing power parity between two countries' currencies will be lower than the equilibrium ER, when expressed in terms of the higher productivity country.
e) the larger the productivity differential in tradables between two countries, the deeper the differences in wages and in non-tradables' prices and, consequently, the wider the gap between the PPP and the equilibrium exchange rate.

[8] Cf. Rogoff (1996) for a recent and useful representation of the purchasing power parity debate and Samuelson (1994) for a reassessment of the Balassa-Samuleson theory. A recent positive empirical test for the Balassa-Samuelson model appears in Heston, Nuxoll and Summers (1994).

[9] It has been argued that, "in a technological inferior country, education and medical care might be superficially cheaper than in an advanced country, but actually would be more expensive when proper account is taken of the difference in the quality of services" (Officer (1974:874)). Moreover, "to assume equal prices for (identical) services is to assume equal availability (and 'X' efficiency) of the complementary factors of production that determine the marginal productivity of those sevices" (Isenman (1980:66)). The same argument about "comparison resistant" services re-emerged later in discussion of the empirical work by ICP on PPP-adjusted income comparisons. Maddison (1983:34) asserted that, for "comparison resistant" services, the productivity of inputs was assumed to be the same

in developed and underdeveloped countries leading to an over-exaggeration of LDCs levels of real income. Along this line, cf. recent contributions by Dowrick and Quiggan (1997) and Honohan (1998).

[10] Bahgwati (1984:282) argued that the theoretical argument in the productivity differential model implied two unrealistic consequences, that the wage-rental ratio is equal across countries and that capital/labour ratios are also equal across countries within each activity.

[11] Cf. Clague (1988) for a theoretical representation of the productivity differential and the capital-labour models.

[12] Geary-Khamis "international" prices are not actual market prices but a weighted average of the prices observed in each country, where countries' shares in world output are used as weights. Such a set of prices is inevitably arbitrary and it is biased for the larger and richer countries. Alternative weighting, such as using world population shares instead of output shares have been suggested (Isenman (1980)) but not put into practice. Other multilateral methods, such as EKS, are used by OECD and EUROSTAT in an attempt to solve the problem. The EKS alternative represents a multilaterasation of the the Fisher "ideal" binary index (Ahmad (1998); Dowrick (1998)). Cf. Maddison (1982, 1989, 1991) for alternative estimates at 1970, 1980 and 1985 dollars at US relative prices.

[13] ICOP has not escaped criticism. Data requirements to produce PPPs from an industry of origin approach are more demanding than from the expenditure side. Prices for output and inputs are needed for the former while only prices for the final product will be necessary for the latter. Heston and Summers (1996:22) critizise production side comparisons approach because of the assumptions made about the relations of gross output to value added and unit values to prices of specified items. In addtion, Heston, Nuxoll and Summers (1994) point out that comparable input-output tables will be require across countries in order to compare GDPs from net value added by output sector. Finally, low coverage of the so called "unit value ratios" is another problem in ICOP estimates. Cf. Jorgenson (1993) for a detailed criticism.

[14] For agriculture, cf. van Zanden (1991) and O'Brien and Prados de la Escosura. For manufacturing, Broadberry and Fremdling (1990), Broadberry (1997b), Burger (1997) and Dormois and Bardini (1995).

[15] Besides, the fixed-base, PPP-adjusted, real product data has the presentation advantage that growth rates corresponding to common currency units are the same as those calculated at national accounts. A significant strand of the literature defends the view defends that the best estimates of growth rates are those obtained from national accounts (Bhagwati and Hansen (1973); Isenman (1980); Kravis and Lipsey (1991); Maddison (1991, 1995)), on the grounds that "using domestic prices to measure growth rates is more reliable, because those price characterize the trade offs faced by the decision making agents"(Nuxoll (1994)). Kravis and Lipsey (1991:458) argued that growth rates derived from domestic prices were preferable because of the basket of goods used "reflected the preferences of purchasers of final product in one of the years being compared". The drawback for international comparisons derives from the fact that an equal growth in two different countries for a given good contributes differently to aggregate growth".

[16] Thus, relative prices would usually change after a while rendering the base year weights obsolete However, Crafts (1984a) carried out comparisons of labour productivity in manufacturing for advanced European countries prior to World War I using trading exchange rates on the grounds that relative positions in 1970 dollars were not much different from those obtained at current exchange rates. In the context of advanced, open countries under the Classical Gold Standard, Crafts (1984b) claimed that comparisons on the basis of the trading exchange rates are acceptable. This kind of reasoning would amount to support the strong version of the PPP doctrine in the Gold Standard years.

[17] In fact, Summers and Heston (1988, 1991) have attempted to mitigate the Laspeyres fixed-index problem through the reconciliation of national accounts and international benchmark data by producing a chain index real GDP series in which the growth rate for any period is based upon international prices closer to this period. Summers and Heston (1991) results have been disputed because of its lack of transparence and ambiguity, and later reconsidered by their own authors (Summers and Heston PWT5.5 (1993)). Maddison (1991, 1995), for example, argued that the "consistentising" of the succesive ICP rounds is a more probable source of error than national accounts.

[18] In fact, as Maddison (1995, Table C-10) shows, the widest range of variation between different ICP rounds can reach around 20 per cent for Norway, Italy, Belgium, Germany or Ireland, all countries considered in this paper.

[19] As it will show below, the short-cut approach helps to reduce the index number problem by providing a less remote base year, i.e., 1913 or 1929 for late 19th or early 20th century comparisons. In fact, it is the purpose of this paper to provide current price estimates of PPP-adjusted (real) income per head.

[20] Estimating short-cuts is clearly a different task from estimating a model since the short-cut method's goal is to find a reliable empirical relationship between PPP-adjusted income and a set of variables, including ER-converted income, for which data are available for out of sample countries or years, while in a model causal relationships are explored. Notwithstanding this caveat, a rationale should exist in the election of variables for the short-cut estimation (Clague (1986b)). An alternative to short-cut estimates could be provided by the so-called "reduced information method", which requires price data for only a selected group of goods and services. However, data availability makes this procedure more space- and time-restrictive than the straight forward short-cut estimation. Examples of historical applications of the "reduced information method" are O'Brien and Keyder (1978), Fremdling (1991) , Dormois and Bardini (1995) and Burger (1997). The best present-day example is in Ahmad (1988).

[21] Kravis, Heston and Summers (1978b:9) accepted the productivity differential theory.

[22] KHS relied on ICP (Phase II) findings for 16 countries in 1970 (Kravis, Heston and Summers (1978a)).

[23] KHS also included another variable, price isolation, which looked at the concordance of changes in a country's prices (ER-adjusted) with changes in world prices, as measured by the mean squared difference between the country's GDP implicit deflator and the world's one. Price isolation would widen the PPP-ER differential and the rationale is that the wider the inflation differential, the deeper the country's isolation and, hence, the lower the prices for non tradables. However, the opposite effect could also be predicated for price isolation. The higher a country's inflation, the higher its prices relative to the world prices and, consequently, the lower its PPP-adjusted income. In subsequent work, Summers and Heston (1984), using ICP Phase III data for 34 countries in 1975 -from Kravis, Heston and Summers (1982)-, together with data for ICP Phase II, dismissed the price isolation variable to concentrate on the relationship between the PPP-adjusted per capita income, on the one hand, and the ER-converted per capita income and the relative openness measure, on the other. This method was, by the way, abandoned by Summers and Heston (1988?, 1991) who chose, as an alternative, the so-called post-adjustment price data from the UN, that is, the reduced information provided by UN estimates on the cost of living for international civil servants in capital cities around the world. Despite its limited representativeness of the cost of living for a country's average citizen, such an indicator cast very high correlation with the PPP-adjusted income (KHS:226). It is interesting to notice that, however, KHS did not use post-adjustment data because, "particularly for as Western basket of goods, the ratio of capital city prices to prices in the rest of the country tends to be much higher in many African countries than is the case elsewhere" (p. 228).

[24] Openness, in his view, was implictly taken by KHS as a proxy for natural resource abundance that is, in turn, associated to the production of tradables. Clague (1986b:317) noted that a high degree of openness was associated by some economists with a large share of non tradables in GDP which, in turn, is associated to a high price level though, in his view, were two different concepts.

[25] Kravis, Heston and Summers (1978b:222) argued that, "to the extent development policies push up the internal prices of traded goods relative to world prices, they lead to an exaggeration of nominal GDP relative to real GDP but to the extent that they depress the prices of non-traded goods they have the opposite effect".

[26] Clague (1988), p. 241, points that the choice of underlying theoretical model matters. In the specific factors model the tariff shifts labour towards the import-substituting sector raising wages and, consequently, the price of services and the aggregate price level. In turn, in the capital-labour model the effect of the tariff on factor prices depends upon relative factor endowments in the tradable sector. If

import-competing sectors are capital-intensive, the tariff reduces wages and raises the price of capital causing the price of services to fall.

[27] Cf. Isenman (1980), Clague (1986a, 1986b), Ahmad (1996). Isenman (1980), on the basis of the same sample of 16 countries for 1970 (ICP Phase II), produced alternative short-cut estimates of real income per head in which the degree of openness and price isolation was replaced by the relative endowment of skills. Later, Clague (1986a, 1986b) investigated, for a sample of 31 countries in 1975 (ICP Phase III), the extent to which differences in country rankings derived from choosing the PPP or the exchange rate as a converter of national GDP into a common currency (US$), could be attributed to the endowment of natural resources (share of minerals in GDP), the international position of a country (as measured by the trade balance and tourist receipts), productivity differentials (proximated by educational attainment level) and macroeconomic policies (measured by the growth of money supply). A further exploration for a 60-strong country sample was carried out by Clague (1988) for 1980 (ICP Phase IV). The latest attempt to provide short-cut alternatives to KHS method has been carried out by Ahmad (1996) for different data sets from ICP Phases III, IV and V (covering 34, 60 and 56 countries in 1975, 1980 and 1985, respectively), first separately and, then, pooled. However, it was an alternative data set for 76 countries with 1985 as the base year was the one from which the short-cut regressions were derived.

[28] As Balassa (1973:1265) pointed out, in LDCs where a large proportion of imports are financed by the inflow of of foreign capital, "the actual exchange rate will be lower than the rate which would ensure equilibrium in the balance of trade in the absence of a capital inflow" and, as a consequence, "the ratio of PPP to the equilibrium exchange rate will be overestimated". It should be beared in mind that the price level is defined in the PPP literature as the PPP/ER ratio.

[29] Also, in Ahmad (1996) short-cut equation, along the nominal (ER-converted) income stand the secondary school enrollment ratio (and the daily supply of calories per person, although the favoured equation did not include the calories' intake). The rationale behind the chosen specification is that the trading exchange rates underlying nominal income equate tradables' prices while school enrollment (and calories intake) allow for the PPP/ER differential. Ahmad considered, however, a wider range of variables, including openness, a measure for overluation of the currency (the black market premium), the share of agriculture in GDP and mean years of schooling. Other variables were considered but not taken into the regressions because dearth of data such as natural resource endowments, mean years of schooling embodied in the labour force, supply of calories as percent of requirement -a health index that promotes productivity-, population per doctor, hourly output per worker in manufacturing, the share of manufactures in exports and the share of manufactured exports in manufacturing value added.

[30] Clague (1986b) results tended to favour the second interpretation.

[31] The proposal, that was never put into practice, would be an extrapolation of a structural relationship observed for a sample of countries to an off-sample epoch and group of countries. Balassa (1973) gave a cautious negative answer to the similar, but not identical, proposal by David (1972) of applying a structural relationship found for DCs to LDCs.

[32] It has been argued that when real product is the dependent variable nominal (ER-converted) product as an independent variable explains alone most of the variance and leaves little room to allow for additional explanatory variables (Clague (1986b); Isenman (1980)). I follow previous work by Kravis and Lipsey (1983) and Clague (1985, 1986a, 1986b). Isenman (1980) used its inverse, the so-called ER deviation. Alternatively, KHS and Ahmad (1996) chose to investigate the determinants of PPP-adjusted per capita income.

[33] By characteristicity it is meant the extent to which the sample of items price-compared and the weights used in the aggregation reflect those of the countries being compared (Kravis (1984:10).

[34] Cf. Maddison (1982). The two most well-known multilateral methods, Geary-Khamis and EKS present problems of economic interpretation. For the former, so called "international prices" are obtained through arbitrary weighting, that is, countries' shares in world output while the latter starts is a generalised the Fisher "ideal" index, which significance in uncertain (Cf Dowrick (1998)). "The EKS involves a two-step process. First getting a set of binary Fisher indices for all pairs of countries and then

making them transitive by computing geometric means of all direct and indirect indices" (Ahmad (1998)).

[35] In algebraic form, $\sum PiQi/(\sum PiQi/\sum PoQi)=\sum PoQi$, where P(Q) are prices (quantities) for each country (i) or the star country, the USA (o). In other words, current GDP at national currency divided by a Paasche PPP equals a "quantity" Laspeyres index. Conversely, a Paasche "quantity" index will result when a Lapeyres PPP is used.

[36] Transitivity through the star country, as in Paasche binary comparisons, represents, however, the disadvantage of making the results depend upon the selection of the base country.

[37] Against this view, Balassa (1973, 1974) suggested the Fisher "ideal" index as the suitable weighting scheme that was supported from a theoretical position by Samuelson (1974).

[38] In fact, the actual PPP-adjusted relative level of a country will be overestimated by a Lapeyres quantity index and understimated by a Paasche quantitity index (Cf Dowrick (1998)). Balassa (1973:1260) states that "assumming identical and homothetical indifference maps in the countries under comparison, Hicks' substitution theorem will lead to the conclusion that a country's consumption pattern will be 'slanted' towards goods whose prices are relatively low in that country".

[39] Other potential variables: the share of labour employed in agriculture and the contribution of agriculture to GDP were not taken into the short-cut regression because they should be captured in the natural endowments variable. Moreover, while they are associated to lower levels of development in Europe, this is not necessarily the case in the New World.

[40] The evidence for wages refers to earnings per hour in manufacturing industries. The source is ILO Yearbooks for the years convered in Table 1.

[41] Clague (1988), p. 241, emphasised a positive relationship between country size and the price level if increasing returns to scale are assumed for tradable production but not for nontradable production.

[42] Countries more exposed to international trade tend to grow faster (Dollar (1992); Feder (1983); Frankel and Romer (1996)). Unfortunately, lack of historical data prevented to include services.

[43] In the specific factors model the openness variable might have a positive, zero or negative coefficient in his association with the price level depending on whether changes in openness are determined by changes in resource abundance, resource diversity or tariffs (Clague (1988), p. 243).

[44] The sources used appear in Table 1.The pre-1970 sample could have been enlarged with the detailed extrapolations from 1950 to 1955 by Gilbert and Associates (1958) and, further up, to 1960 by Kravis (1965) and Denison (1967), independently. Moreover, following Kravis and Lipsey (1987) and Dabán, Doménech and Molinas (1997), PPPs could have been estimated for missing years in the 1970-1990 bracket by projecting actual PPPs with the inflation differential between each country and the US, in a replica of the weak version of the PPP doctrine. Widening the coverage, in particular, for the pre-1970 period, would represent the advantage of a more balanced sample of countries over 1950-90 but I decided to restrict the sample to those countries and years for which PPPs (and, thus, PLs) have ben directly computed and not extrapolated. I have carried, however, the same set of regressions presented in Table 2 for the enlarged sample (including extrapolated PLs) without finding strong discrepancies between them.

[45] In the case where the largest set of countries is a priority, choosing the lattest and more sophisticated ICP round, as in Maddison (1991, 1995) and Ahmad (1996), may be justified. In the present case, this choice is unclear since characteristicity prevails over transitivity and, more important, opting for a single benchmark implies a loss of information given the fact that, from the point of view of indirect estimation of PPPs for earlier periods, all information from different ICP rounds should be considered. As Heston and Summers (1993:359) put it, "we should view the results of succesive benchmark comparisons as informing us about the relative positions of the countries throughout the period covered".

[46] For pooling available data for each benchmark, binary comparisons have the advantage of avoiding the incomparability problem of the multilateral approach refered earlier, since as the country coverage changes from one benchmark to another, and the multilateral approach is based in comparing all given countries simultaneously, adding and dropping countries alter the relationship between any pair of countries (Ahmad (1994)).

[47] The transitivity through the star country makes Paasche PLs, that is, measured at US relative prices, the least ambiguous to carry out comparisons across countries.I propose concentrate on these "best" estimates.

[48] Some intuitive associations along these lines could be derived from Bordo and Schwartz (1996).

[49] This is identical to converting each country' own currency GDP per head into dollars at the PPP exchange rate.

[50] Balassa (1973) argued against extrapolating a PPP-trading exchange ratio derived from developed to underdeveloped nations on the grounds of their different patterns of development and resource endowment as well as the LDC's higher Government intervention in foreign trade. In the present case, it should be noted that a more homogeneous group of market economies from Europe and the European off-shoots (plus Japan) is considered throughout the entire period and that the relative degree of openness is taken into account.

[51] Thus, the relative position of the Scandinavian economies would be overexaggerated while those of Latin countries underestimated. Cf. Estevadeordal (1997) estimates of the (adjusted) trade intensity ratios c. 1913.

[52] Maddison's deviation for 1990 should be zero by construction (cf. Maddison (1995)) but instead a 4 % deviation ratio has been detected. Such an average deviation derives from discrepancies between succesive OECD publications of national accounts data.

[53] Maddison's series have been linked to the new data available for national estimates of real product per head. Most segments replaced in Maddison's series correspond to the 19th century. No attempt has been made, however, to update Bairoch's estimates as they were computed more than two decades ago and the data base is quite different from those used in Maddison (1995) and in my new estimates.

[54] A previous conversion was required from Geary-Khamis to Paasche PPP converters to trasform Maddison's "international" dollars into US dollars, that is, countries' output per head expressed at US relative prices, for 1990. Maddison (1995, Table C-6) provides the appropriate ratios for the conversion. I have chosen to use only Maddison's latest set of figures expressed in US 1990 $ but his earlier sets (in 1970, 1980, and 1985 US dollars) could also be considered in the comparison (Maddison (1982, 1989, 1991), and the results would cast, as already pointed out by O'Rourke and Williamson (1997), significant differences about country rankings and convergence due to the fact that each different numeraire (1970 or 1985 US $) is linked to a different ICP benchmark and also to Maddison's revision of countries' data.

[55] It must be acknowledged, however, that the new GDP estimates by Toutain (1997) do contribute to the French improvement substantially, though they are already included in Maddison (1995).

[56] It should be bear in mind that in my new estimates Germany refers to the whole country as it is based on nominal income at current prices whereas constant price estimates expressed in present-time dollars start from West Germany levels of per capita income whatever adjustments are performed to the series later.

[57] The mechanism through which labour scarcity affects prices is explained both by the productivity differential and the factor abundance models presented in section I of the paper.

[58] Levels of average nominal protection for the decades before World War I (Bairoch (1989)) help to understand why poor but protectionist countries (i.e., Spain inthe late 19th and early 20th century) do not improve their relative position in PPP-adjusted income estimates compared to exchange rate adjusted ones as much as other countries in the same range of per capita product, since their domestic price levels are relatively high.

[59] It should be remembered that both O'Brien and Keyder (1978) and Fremdling (1991) carried their comparison for France and Germany with Britain at current prices and the relative positions of the two countries followed somehow similar patterns to the ones derived from the new dataset.

Table 5. Relative GDP per Head, 1820-1990*
[USA = 1]

1820		1830		1840	
1 Australia	1,030	1 Australia	1,030	1 USA	1,000
2 USA	1,000	2 USA	1,000	2 UK	0,933
3 UK	0,965	3 UK	0,965	3 Netherlands	0,858
4 Netherlands	0,919	4 Netherlands	0,919	4 Belgium	0,794
5 France	0,638	5 France	0,638	5 France	0,700
				6 Sweden	0,585
				7 Austria	0,514

1850		1860		1870		1880	
1 Australia	1,088	1 New Zealand	1,416	1 New Zealand	1,217	1 Australia	1,042
2 USA	1,000	2 Australia	1,272	2 Australia	1,087	2 New Zealand	1,031
3 UK	0,929	3 USA	1,000	3 USA	1,000	3 USA	1,000
4 Netherlands	0,815	4 UK	0,952	4 UK	0,937	4 UK	0,866
5 Belgium	0,802	5 Belgium	0,870	5 Belgium	0,910	5 Belgium	0,849
6 Canada	0,753	6 Netherlands	0,810	6 France	0,760	6 France	0,705
7 France	0,715	7 France	0,791	7 Canada	0,740	7 Denmark	0,676
8 Denmark	0,714	8 Canada	0,760	8 Denmark	0,720	8 Netherlands	0,673
9 Spain	0,568	9 Denmark	0,685	9 Netherlands	0,670	9 Canada	0,671
10 Germany	0,567	10 Germany	0,603	10 Norway	0,657	10 Norway	0,629
11 Sweden	0,517	11 Italy	0,585	11 Germany	0,630	11 Germany	0,604
12 Austria	0,511	12 Spain	0,568	12 Italy	0,600	12 Spain	0,577
13 Portugal	0,475	13 Sweden	0,566	13 Sweden	0,577	13 Sweden	0,563
		14 Austria	0,493	14 Spain	0,562	14 Italy	0,544
		15 Portugal	0,493	15 Austria	0,561	15 Austria	0,519
		16 Greece	0,440	16 Portugal	0,491	16 Portugal	0,458
		17 Finland	0,381	17 Finland	0,455	17 Finland	0,424
				18 Hungary	0,419	18 Hungary	0,414
				19 Greece	0,404	19 Greece	0,410
						20 Russia	0,319
						21 Japan	0,229

1890		1900		1913	
1 Australia	1,102	1 USA	1,000	1 USA	1,000
2 USA	1,000	2 New Zealand	0,940	2 Australia	0,943
3 New Zealand	0,966	3 Australia	0,919	3 New Zealand	0,899
4 UK	0,867	4 UK	0,889	4 Canada	0,878
5 Belgium	0,835	5 Belgium	0,792	5 UK	0,805
6 Canada	0,766	6 Canada	0,789	6 Argentina	0,759
7 France	0,750	7 France	0,743	7 France	0,745
8 Switzerland	0,708	8 Denmark	0,721	8 Denmark	0,709
9 Denmark	0,701	9 Germany	0,710	9 Norway	0,693
10 Germany	0,690	10 Norway	0,691	10 Belgium	0,686
11 Netherlands	0,666	11 Switzerland	0,689	11 Germany	0,685
12 Norway	0,658	12 Sweden	0,659	12 Sweden	0,670
13 Sweden	0,598	13 Netherlands	0,641	13 Switzerland	0,664
14 Spain	0,586	14 Spain	0,532	14 Netherlands	0,577
15 Austria	0,544	15 Austria	0,531	15 Austria	0,536
16 Italy	0,535	16 Italy	0,521	16 Italy	0,536
17 Portugal	0,501	17 Finland	0,507	17 Spain	0,523
18 Hungary	0,464	18 Hungary	0,456	18 Finland	0,494
19 Finland	0,452	19 Portugal	0,441	19 Ireland	0,486
20 Greece	0,403	20 Russia	0,359	20 Hungary	0,460
21 Russia	0,354	21 Greece	0,314	21 Portugal	0,415
22 Japan	0,281	22 Japan	0,310	22 Greece	0,412
				25 Russia	0,358
				26 Japan	0,345

* Pre-World War I Borders

Table 5. Relative GDP per Head, 1820-1990*
[USA = 1]

1913		1929		1938	
1 USA	1,000	1 USA	1,000	1 USA	1,000
2 Australia	0,943	2 Australia	0,804	2 UK	0,868
3 New Zealand	0,899	3 Canada	0,801	3 Australia	0,837
4 Canada	0,878	4 New Zealand	0,756	4 Germany	0,837
5 UK	0,818	5 UK	0,724	5 New Zealand	0,812
6 Argentina	0,759	6 Switzerland	0,709	6 Canada	0,811
7 France	0,745	7 Denmark	0,673	7 Norway	0,801
8 Denmark	0,709	8 Norway	0,658	8 Switzerland	0,799
9 Norway	0,693	9 Sweden	0,653	9 Sweden	0,779
10 Belgium	0,686	10 Argentina	0,642	10 Denmark	0,751
11 Germany	0,685	11 France	0,591	11 Netherlands	0,670
12 Sweden	0,670	12 Germany	0,586	12 Belgium	0,648
13 Switzerland	0,664	13 Netherlands	0,578	13 France	0,619
14 Austria	0,628	14 Belgium	0,549	14 Austria	0,606
15 Netherlands	0,577	15 Ireland	0,525	15 Finland	0,550
16 Italy	0,536	16 Austria	0,518	16 Italy	0,544
17 Spain	0,523	17 Italy	0,468	17 Argentina	0,531
18 Czechoslovakia	0,515	18 Spain	0,467	18 Czechoslovakia	0,519
19 Finland	0,494	19 Finland	0,457	19 Ireland	0,499
20 Ireland	0,477	20 Czechoslovakia	0,456	20 Hungary	0,420
21 Hungary	0,449	21 Hungary	0,387	21 Romania	0,419
22 Greece	0,415	22 Japan	0,374	22 Portugal	0,400
23 Portugal	0,415	23 Romania	0,361	23 Bulgaria	0,390
24 Romania	0,406	24 Portugal	0,345	24 Japan	0,385
25 Bulgaria	0,397	25 Poland	0,330	25 Poland	0,381
26 Japan	0,345	26 Yugoslavia	0,295	26 Turkey	0,348
27 Turkey	0,328	27 Greece	0,292	27 Greece	0,340
		28 Bulgaria	0,287	28 Yugoslavia	0,325
		29 Turkey	0,275	29 Spain	0,315

* Interwar Borders

Table 5. Relative GDP per Head, 1820-1990*
[USA = 1]

1950		1960		1975		1990	
1 USA	1,000	1 USA	1,000	1 Sweden	1,011	1 Switzerland**	1,025
2 Canada	0,762	2 Canada	0,820	2 USA	1,000	2 USA	1,000
3 Argentina	0,671	3 Sweden	0,751	3 Switzerland	0,989	3 Canada**	0,939
4 New Zealand	0,670	4 Australia	0,705	4 Canada	0,920	4 Germany**	0,911
5 Norway**	0,639	5 Switzerland	0,690	5 Norway	0,902	5 Japan**	0,900
6 Sweden	0,638	6 New Zealand	0,686	6 France**	0,883	6 Denmark**	0,893
7 Switzerland	0,636	7 UK	0,651	7 Australia	0,867	7 France**	0,890
8 UK**	0,616	8 France	0,640	8 Germany**	0,856	8 Sweden**	0,878
9 Denmark**	0,610	9 Germany	0,639	9 Denmark**	0,846	9 Belgium**	0,843
10 France**	0,571	10 Norway	0,618	10 Finland	0,828	10 Netherlands**	0,819
11 Australia	0,566	11 Denmark	0,617	11 Netherlands**	0,814	11 Norway**	0,809
12 Belgium**	0,552	12 Finland	0,591	12 Belgium**	0,801	12 Italy**	0,808
13 Finland	0,527	13 Belgium	0,588	13 Austria**	0,741	13 Austria**	0,795
14 Netherlands**	0,512	14 Netherlands	0,547	14 Japan**	0,736	14 Finland**	0,794
15 Germany**	0,441	15 Austria	0,525	15 UK**	0,733	15 UK**	0,793
16 Austria	0,430	16 Italy	0,498	16 New Zealand	0,723	16 Australia**	0,787
17 Ireland	0,418	17 Argentina	0,478	17 Italy**	0,660	17 New Zealand**	0,659
18 Italy**	0,352	18 Ireland	0,450	18 Spain**	0,593	18 Spain**	0,578
19 Portugal	0,322	19 Japan	0,389	19 Greece	0,527	19 Portugal**	0,528
20 Spain	0,321	20 Greece	0,370	20 Portugal	0,480	20 Ireland**	0,502
21 Greece	0,316	21 Portugal	0,336	21 Ireland**	0,469	21 Greece**	0,395
22 Turkey	0,293	22 Spain	0,330	22 Argentina	0,440	22 Argentina	0,322
23 Japan	0,255	23 Turkey	0,252	23 Turkey	0,304	23 Turkey**	0,297

*Post-World War II Borders

** Derived with directly computed Paasche PPPs. 1950 PPPs from Gilbert and Kravis (1958); otherwise, from ICP phases II-VI, collected in Maddison (1995).

Sources: Appendix, Table A.1

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1820 (Pre-World War I Borders)

Prados de la Escosura		Maddison(R)		Exchange Rate	
1 Australia	1,030	1 Netherlands	1,670	1 Australia	1,293
2 USA	1,000	2 UK	1,483	2 UK	1,166
3 UK	0,965	3 Australia	1,316	3 USA	1,000
4 Netherlands	0,919	4 USA	1,000	4 Netherlands	0,958
5 France	0,638	5 France	0,829	5 Sweden	0,751
		6 Sweden	0,740	6 France	0,656

Relative GDP per Head in 1830 (Pre-World War I Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 Australia	1,255	1 UK	1,448	1 USA	1,000	1 Australia	1,998
2 USA	1,000	2 Netherlands	1,424	2 Netherlands	0,964	2 UK	1,337
3 UK	0,977	3 Austria	1,253	3 UK	0,961	3 USA	1,000
4 Netherlands	0,855	4 USA	1,000	4 Australia	0,889	4 Netherlands	0,929
5 France	0,681	5 France	0,831	5 France	0,733	5 France	0,881
6 Sweden	0,559	6 Sweden	0,692	6 Sweden	0,539	6 Sweden	0,819
7 Austria	0,504					7 Austria	0,435

Relative GDP per Head in 1840 (Pre-World War I Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 USA	1,000	1 UK	1,396	1 USA	1,000	1 UK	1,134
2 UK	0,933	2 Netherlands	1,369	2 UK	0,970	2 USA	1,000
3 Netherlands	0,858	3 Belgium	1,194	3 Netherlands	0,941	3 Belgium	0,918
4 Belgium	0,794	4 Austria	1,156	4 Belgium	0,850	4 Netherlands	0,853
5 France	0,700	5 USA	1,000	5 France	0,744	5 France	0,828
6 Sweden	0,585	6 France	0,885	6 Sweden	0,488	6 Sweden	0,819
7 Austria	0,514	7 Sweden	0,635			7 Austria	0,413

Relative GDP per Head in 1850 (Pre-World War I Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 Australia	1,088	1 Australia	1,903	1 USA	1,000	1 Australia	1,452
2 USA	1,000	2 UK	1,436	2 UK	0,996	2 UK	1,082
3 UK	0,929	3 Netherlands	1,372	3 Netherlands	0,928	3 USA	1,000
4 Netherlands	0,815	4 Belgium	1,203	4 Belgium	0,894	4 Belgium	0,838
5 Belgium	0,802	5 Austria	1,119	5 France	0,724	5 France	0,792
6 Canada	0,753	6 Denmark	1,097	6 Spain	0,681	6 Netherlands	0,781
7 France	0,715	7 USA	1,000	7 Germany	0,670	7 Canada	0,726
8 Denmark	0,714	8 France	0,865	8 Portugal	0,565	8 Spain	0,618
9 Spain	0,568	9 Germany	0,853	9 Denmark	0,557	9 Denmark	0,617
10 Germany	0,567	10 Canada	0,783	10 Sweden	0,459	10 Germany	0,444
11 Sweden	0,517	11 Spain	0,700			11 Sweden	0,417
12 Austria	0,511	12 Sweden	0,631			12 Austria	0,416
13 Portugal	0,475	13 Portugal	0,488			13 Portugal	0,302

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1860 (Pre-World War I Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	New Zealand	1,416	1 Australia	1,741	1 Australia	1,165	1 New Zealand	2,697
2	Australia	1,272	2 New Zealand	1,716	2 UK	1,008	2 Australia	2,064
3	USA	1,000	3 UK	1,368	3 USA	1,000	3 UK	1,070
4	UK	0,952	4 Belgium	1,232	4 Belgium	0,885	4 USA	1,000
5	Belgium	0,870	5 Netherlands	1,113	5 Netherlands	0,816	5 Belgium	0,998
6	Netherlands	0,810	6 USA	1,000	6 Canada	0,749	6 France	0,833
7	France	0,791	7 Austria	0,935	7 France	0,656	7 Canada	0,765
8	Canada	0,760	8 Denmark	0,863	8 Germany	0,639	8 Netherlands	0,669
9	Denmark	0,685	9 Greece	0,855	9 Spain	0,625	9 Spain	0,619
10	Germany	0,603	10 France	0,850	10 Italy	0,544	10 Denmark	0,611
11	Italy	0,585	11 Germany	0,827	11 Denmark	0,531	11 Italy	0,531
12	Spain	0,568	12 Italy	0,722	12 Portugal	0,497	12 Germany	0,502
13	Sweden	0,566	13 Canada	0,679	13 Finland	0,435	13 Sweden	0,458
14	Austria	0,493	14 Spain	0,638	14 Greece	0,415	14 Austria	0,357
15	Portugal	0,493	15 Sweden	0,577	15 Sweden	0,406	15 Portugal	0,319
16	Greece	0,440	16 Finland	0,466			16 Greece	0,223
17	Finland	0,381	17 Portugal	0,376			17 Finland	0,199

Relative GDP per Head in 1870 (Pre-World War I Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	New Zealand	1,217	1 Australia	1,630	1 UK	1,011	1 New Zealand	1,850
2	Australia	1,087	2 New Zealand	1,548	2 USA	1,000	2 Australia	1,395
3	USA	1,000	3 UK	1,466	3 Belgium	0,919	3 UK	1,038
4	UK	0,937	4 Belgium	1,444	4 Netherlands	0,815	4 USA	1,000
5	Belgium	0,910	5 Netherlands	1,115	5 France	0,703	5 Belgium	0,995
6	France	0,760	6 USA	1,000	6 Germany	0,686	6 France	0,698
7	Canada	0,740	7 Austria	0,954	7 Norway	0,678	7 Canada	0,619
8	Denmark	0,720	8 Denmark	0,860	8 Denmark	0,547	8 Denmark	0,592
9	Netherlands	0,670	9 France	0,750	9 Spain	0,530	9 Netherlands	0,586
10	Norway	0,657	10 Germany	0,701	10 Finland	0,504	10 Norway	0,493
11	Germany	0,630	11 Canada	0,687	11 Italy	0,502	11 Germany	0,457
12	Italy	0,600	12 Greece	0,666	12 Austria-Hungary	0,491	12 Spain	0,451
13	Sweden	0,577	13 Italy	0,647	13 Portugal	0,435	13 Italy	0,441
14	Spain	0,562	14 Sweden	0,577	14 Greece	0,402	14 Sweden	0,377
15	Austria	0,561	15 Norway	0,541	15 Sweden	0,396	15 Austria	0,365
16	Austria-Hungary	0,493	16 Spain	0,538			16 Austria-Hungary	0,306
17	Portugal	0,491	17 Finland	0,477			17 Portugal	0,282
18	Finland	0,455	18 Hungary	0,396			18 Finland	0,233
19	Hungary	0,419	19 Portugal	0,373			19 Hungary	0,200
20	Greece	0,404					20 Greece	0,179

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1880 (Pre-World War I Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 Australia	1,042	1 Australia	1,521	1 USA	1,000	1 New Zealand	1,320
2 New Zealand	1,031	2 New Zealand	1,316	2 UK	0,842	2 Australia	1,315
3 USA	1,000	3 UK	1,227	3 Belgium	0,730	3 USA	1,000
4 UK	0,866	4 Belgium	1,193	4 Netherlands	0,671	4 UK	0,872
5 Belgium	0,849	5 USA	1,000	5 France	0,575	5 Belgium	0,857
6 France	0,705	6 Netherlands	0,951	6 Norway	0,575	6 France	0,588
7 Denmark	0,676	7 Austria	0,761	7 Germany	0,549	7 Canada	0,525
8 Netherlands	0,673	8 Denmark	0,724	8 Denmark	0,491	8 Netherlands	0,525
9 Canada	0,671	9 Germany	0,697	9 Finland	0,405	9 Denmark	0,518
10 Norway	0,629	10 Greece	0,664	10 Spain	0,400	10 Spain	0,488
11 Germany	0,604	11 France	0,660	11 Austria-Hungary	0,390	11 Norway	0,456
12 Spain	0,577	12 Spain	0,575	12 Italy	0,385	12 Germany	0,424
13 Sweden	0,563	13 Canada	0,573	13 Sweden	0,375	13 Italy	0,386
14 Italy	0,544	14 Italy	0,527	14 Portugal	0,334	14 Sweden	0,361
15 Austria	0,519	15 Sweden	0,500	15 Greece	0,322	15 Austria	0,335
16 Austria-Hungary	0,466	16 Norway	0,466	16 Russia	0,277	16 Austria-Hungary	0,275
17 Portugal	0,458	17 Finland	0,374			17 Portugal	0,256
18 Finland	0,424	18 Hungary	0,367			18 Hungary	0,200
19 Hungary	0,414	19 Portugal	0,307			19 Finland	0,198
20 Greece	0,410	20 Russia	0,298			20 Greece	0,187
21 Russia	0,319	21 Japan	0,278			21 Russia	0,136
22 Japan	0,229					22 Japan	0,081

Relative GDP per Head in 1890 (Pre-World War I Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 Australia	1,102	1 Australia	1,482	1 USA	1,000	1 Australia	1,476
2 USA	1,000	2 New Zealand	1,210	2 UK	0,914	2 New Zealand	1,124
3 New Zealand	0,966	3 UK	1,206	3 Switzerland	0,821	3 USA	1,000
4 UK	0,867	4 Belgium	1,175	4 Belgium	0,734	4 UK	0,884
5 Belgium	0,835	5 Netherlands	1,002	5 Netherlands	0,682	5 Belgium	0,825
6 Canada	0,766	6 USA	1,000	6 Germany	0,625	6 Canada	0,694
7 France	0,750	7 Germany	0,829	7 Norway	0,609	7 France	0,679
8 Switzerland	0,708	8 Denmark	0,784	8 France	0,600	8 Switzerland	0,601
9 Denmark	0,701	9 Austria	0,782	9 Denmark	0,585	9 Germany	0,564
10 Germany	0,690	10 France	0,698	10 Finland	0,429	10 Denmark	0,557
11 Netherlands	0,666	11 Canada	0,689	11 Austria-Hungary	0,420	11 Netherlands	0,545
12 Norway	0,658	12 Greece	0,534	12 Sweden	0,415	12 Norway	0,490
13 Sweden	0,598	13 Spain	0,534	13 Spain	0,374	13 Spain	0,448
14 Spain	0,586	14 Sweden	0,531	14 Italy	0,362	14 Sweden	0,398
15 Austria	0,544	15 Italy	0,521	15 Greece	0,338	15 Italy	0,379
16 Italy	0,535	16 Norway	0,492	16 Portugal	0,314	16 Austria	0,363
17 Portugal	0,501	17 Hungary	0,449	17 Russia	0,212	17 Austria-Hungary	0,308
18 Austria-Hungary	0,491	18 Finland	0,420			18 Portugal	0,291
19 Hungary	0,464	19 Portugal	0,340			19 Hungary	0,259
20 Finland	0,452	20 Japan	0,298			20 Finland	0,222
21 Greece	0,403	21 Russia	0,280			21 Greece	0,180
22 Russia	0,354					22 Russia	0,162
23 Japan	0,281					23 Japan	0,104

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1900 (Pre-World War I Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	USA	1,000	1 New Zealand	1,147	1 USA	1,000	1 New Zealand	1,060
2	New Zealand	0,940	2 UK	1,134	2 UK	0,851	2 USA	1,000
3	Australia	0,919	3 Australia	1,121	3 Switzerland	0,758	3 Australia	0,993
4	UK	0,889	4 Belgium	1,031	4 Belgium	0,696	4 UK	0,923
5	Belgium	0,792	5 USA	1,000	5 Germany	0,617	5 Belgium	0,744
6	Canada	0,789	6 Switzerland	0,920	6 Denmark	0,611	6 Canada	0,724
7	France	0,743	7 Netherlands	0,906	7 Netherlands	0,593	7 France	0,666
8	Denmark	0,721	8 Germany	0,810	8 France	0,583	8 Germany	0,595
9	Germany	0,710	9 Denmark	0,788	9 Norway	0,557	9 Denmark	0,594
10	Norway	0,691	10 Austria	0,733	10 Sweden	0,438	10 Switzerland	0,567
11	Switzerland	0,689	11 France	0,720	11 Finland	0,410	11 Norway	0,546
12	Sweden	0,659	12 Canada	0,720	12 Austria-Hungary	0,400	12 Netherlands	0,508
13	Netherlands	0,641	13 Sweden	0,575	13 Spain	0,339	13 Sweden	0,497
14	Spain	0,532	14 Spain	0,529	14 Italy	0,323	14 Spain	0,348
15	Austria	0,531	15 Italy	0,468	15 Greece	0,290	15 Italy	0,341
16	Italy	0,521	16 Norway	0,453	16 Portugal	0,277	16 Austria	0,341
17	Finland	0,507	17 Hungary	0,437	17 Russia	0,239	17 Austria-Hungary	0,304
18	Austria-Hungary	0,492	18 Finland	0,427			18 Finland	0,284
19	Hungary	0,456	19 Greece	0,420			19 Hungary	0,251
20	Portugal	0,441	20 Russia	0,324			20 Portugal	0,219
21	Russia	0,359	21 Japan	0,307			21 Russia	0,184
22	Greece	0,314	22 Portugal	0,290			22 Japan	0,111
23	Japan	0,310					23 Greece	0,105

Relative GDP per Head in 1913 (Pre-World War I Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	USA	1,000	1 Australia	1,125	1 USA	1,000	1 Australia	1,063
2	Australia	0,943	2 Argentina	1,086	2 Canada	0,835	2 USA	1,000
3	New Zealand	0,899	3 New Zealand	1,069	3 Australia	0,754	3 Canada	0,971
4	Canada	0,878	4 USA	1,000	4 UK	0,707	4 New Zealand	0,966
5	UK	0,805	5 UK	0,991	5 Switzerland	0,705	5 UK	0,715
6	Argentina	0,759	6 Belgium	0,966	6 Belgium	0,655	6 Argentina	0,695
7	France	0,745	7 Canada	0,865	7 Denmark	0,632	7 France	0,645
8	Denmark	0,709	8 Switzerland	0,859	8 New Zealand	0,586	8 Belgium	0,588
9	Norway	0,693	9 Netherlands	0,830	9 Germany	0,555	9 Denmark	0,583
10	Belgium	0,686	10 Denmark	0,800	10 Netherlands	0,552	10 Norway	0,544
11	Germany	0,685	11 Germany	0,754	11 Norway	0,549	11 Germany	0,534
12	Sweden	0,670	12 Austria	0,704	12 France	0,509	12 Switzerland	0,529
13	Switzerland	0,664	13 France	0,687	13 Austria-Hungary	0,499	13 Sweden	0,507
14	Netherlands	0,577	14 Sweden	0,632	14 Sweden	0,498	14 Netherlands	0,460
15	Austria	0,536	15 Ireland	0,547	15 Ireland	0,448	15 Austria	0,352
16	Italy	0,536	16 Greece	0,539	16 Finland	0,381	16 Italy	0,339
17	Spain	0,523	17 Italy	0,527	17 Italy	0,323	17 Spain	0,332
18	Austria-Hungary	0,500	18 Norway	0,463	18 Spain	0,269	18 Austria-Hungary	0,315
19	Finland	0,494	19 Spain	0,442	19 Russia	0,239	19 Ireland	0,288
20	Ireland	0,486	20 Finland	0,424	20 Greece	0,236	20 Finland	0,267
21	Hungary	0,460	21 Hungary	0,424	21 Portugal	0,214	21 Hungary	0,261
22	Portugal	0,415	22 Russia	0,300	22 Japan	0,185	22 Portugal	0,200
23	Greece	0,412	23 Japan	0,269			23 Greece	0,195
24	Russia	0,358	24 Portugal	0,239			24 Russia	0,173
25	Japan	0,345					25 Japan	0,131

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1913 (Interwar Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	USA	1,000	Australia	1,125	USA	1,000	Australia	1,063
2	Australia	0,943	Argentina	1,086	Canada	0,835	USA	1,000
3	New Zealand	0,899	New Zealand	1,069	Australia	0,754	Canada	0,971
4	Canada	0,878	USA	1,000	UK	0,730	New Zealand	0,966
5	UK	0,818	UK	0,991	Switzerland	0,705	UK	0,739
6	Argentina	0,759	Belgium	0,966	Belgium	0,655	Argentina	0,695
7	France	0,745	Canada	0,865	Denmark	0,632	France	0,645
8	Denmark	0,709	Switzerland	0,859	New Zealand	0,586	Belgium	0,588
9	Norway	0,693	Netherlands	0,830	Germany	0,555	Denmark	0,583
10	Belgium	0,686	Denmark	0,800	Netherlands	0,552	Norway	0,544
11	Germany	0,685	Germany	0,754	Norway	0,549	Germany	0,534
12	Sweden	0,670	Austria	0,704	France	0,509	Switzerland	0,529
13	Switzerland	0,664	France	0,687	Sweden	0,498	Sweden	0,507
14	Austria	0,628	Sweden	0,632	Ireland	0,448	Austria	0,474
15	Netherlands	0,577	Ireland	0,547	Czechoslovakia	0,384	Netherlands	0,460
16	Italy	0,536	Greece	0,539	Finland	0,381	Italy	0,339
17	Spain	0,523	Italy	0,527	Italy	0,323	Spain	0,332
18	Czechoslovakia	0,515	Norway	0,463	Hungary	0,273	Czechoslovakia	0,312
19	Finland	0,494	Spain	0,442	Spain	0,269	Ireland	0,277
20	Ireland	0,477	Finland	0,424	Greece	0,236	Finland	0,267
21	Hungary	0,449	Hungary	0,424	Portugal	0,214	Hungary	0,240
22	Greece	0,415	Czechoslovakia	0,423	Bulgaria	0,193	Bulgaria	0,220
23	Portugal	0,415	Bulgaria	0,302	Japan	0,185	Greece	0,202
24	Romania	0,406	Japan	0,269			Romania	0,201
25	Bulgaria	0,397	Portugal	0,239			Portugal	0,200
26	Japan	0,345	Turkey	0,236			Japan	0,131
27	Turkey	0,328					Turkey	0,122

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1929 (Interwar Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 USA	1,000	1 USA	1,000	1 USA	1,000	1 USA	1,000
2 Australia	0,804	2 Switzerland	0,989	2 Canada	0,712	2 Australia	0,760
3 Canada	0,801	3 Netherlands	0,905	3 Switzerland	0,707	3 Canada	0,748
4 New Zealand	0,756	4 New Zealand	0,843	4 Belgium	0,613	4 New Zealand	0,668
5 UK	0,724	5 Australia	0,807	5 New Zealand	0,587	5 UK	0,594
6 Switzerland	0,709	6 Denmark	0,805	6 UK	0,580	6 Switzerland	0,566
7 Denmark	0,673	7 Argentina	0,800	7 Norway	0,577	7 Denmark	0,520
8 Norway	0,658	8 Canada	0,793	8 Netherlands	0,563	8 Norway	0,490
9 Sweden	0,653	9 UK	0,784	9 France	0,549	9 Sweden	0,476
10 Argentina	0,642	10 Belgium	0,753	10 Australia	0,542	10 Argentina	0,469
11 France	0,591	11 France	0,738	11 Denmark	0,528	11 Netherlands	0,395
12 Germany	0,586	12 Sweden	0,666	12 Sweden	0,501	12 France	0,391
13 Netherlands	0,578	13 Germany	0,619	13 Germany	0,430	13 Germany	0,389
14 Belgium	0,549	14 Austria	0,583	14 Austria	0,402	14 Belgium	0,350
15 Ireland	0,525	15 Norway	0,499	15 Ireland	0,370	15 Ireland	0,315
16 Austria	0,518	16 Italy	0,493	16 Finland	0,330	16 Austria	0,301
17 Italy	0,468	17 Czechoslovakia	0,476	17 Czechoslovakia	0,327	17 Spain	0,271
18 Spain	0,467	18 Spain	0,465	18 Italy	0,289	18 Italy	0,251
19 Finland	0,457	19 Ireland	0,448	19 Spain	0,254	19 Finland	0,230
20 Czechoslovakia	0,456	20 Finland	0,423	20 Hungary	0,237	20 Czechoslovakia	0,225
21 Hungary	0,387	21 Hungary	0,388	21 Japan	0,221	21 Hungary	0,162
22 Japan	0,374	22 Greece	0,383	22 Greece	0,218	22 Romania	0,156
23 Romania	0,361	23 Poland	0,331	23 Poland	0,196	23 Japan	0,149
24 Portugal	0,345	24 Japan	0,282	24 Yugoslavia	0,191	24 Portugal	0,134
25 Poland	0,330	25 Portugal	0,236	25 Romania	0,185	25 Poland	0,121
26 Yugoslavia	0,295	26 Yugoslavia	0,214	26 Portugal	0,179	26 Greece	0,100
27 Greece	0,292	27 Turkey	0,195	27 Bulgaria	0,171	27 Yugoslavia	0,092
28 Bulgaria	0,287	28 Bulgaria	0,185			28 Bulgaria	0,089
29 Turkey	0,275	29 Romania	0,181			29 Turkey	0,084

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1938 (Interwar Borders)

Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1 USA	1,000	1 New Zealand	1,125	1 USA	1,000	1 USA	1,000
2 UK	0,868	2 Switzerland	1,074	2 Norway	0,837	2 Germany	0,896
3 Australia	0,837	3 USA	1,000	3 Switzerland	0,776	3 UK	0,877
4 Germany	0,837	4 Denmark	0,984	4 UK	0,761	4 Australia	0,815
5 New Zealand	0,812	5 Australia	0,967	5 Germany	0,726	5 New Zealand	0,805
6 Canada	0,811	6 UK	0,959	6 Sweden	0,707	6 Canada	0,757
7 Norway	0,801	7 Netherlands	0,898	7 Denmark	0,674	7 Norway	0,745
8 Switzerland	0,799	8 Sweden	0,892	8 Belgium	0,654	8 Switzerland	0,740
9 Sweden	0,779	9 Germany	0,891	9 France	0,604	9 Sweden	0,703
10 Denmark	0,751	10 Argentina	0,852	10 Netherlands	0,593	10 Denmark	0,664
11 Netherlands	0,670	11 Belgium	0,803	11 Finland	0,589	11 Netherlands	0,527
12 Belgium	0,648	12 Canada	0,765	12 Ireland	0,418	12 Belgium	0,507
13 France	0,619	13 France	0,749	13 Austria	0,413	13 France	0,436
14 Austria	0,606	14 Norway	0,671	14 Greece	0,380	14 Austria	0,420
15 Finland	0,550	15 Austria	0,604	15 Italy	0,355	15 Italy	0,367
16 Italy	0,544	16 Finland	0,600	16 Czechoslovakia	0,353	16 Finland	0,346
17 Argentina	0,531	17 Italy	0,569	17 Hungary	0,291	17 Argentina	0,313
18 Czechoslovakia	0,519	18 Ireland	0,520	18 Bulgaria	0,271	18 Czechoslovakia	0,296
19 Ireland	0,499	19 Czechoslovakia	0,486	19 Poland	0,240	19 Ireland	0,276
20 Hungary	0,420	20 Greece	0,478	20 Portugal	0,226	20 Romania	0,220
21 Romania	0,419	21 Hungary	0,447	21 Romania	0,221	21 Hungary	0,195
22 Portugal	0,400	22 Japan	0,405	22 Yugoslavia	0,219	22 Portugal	0,174
23 Bulgaria	0,390	23 Poland	0,368	23 Spain	0,217	23 Poland	0,166
24 Japan	0,385	24 Spain	0,330			24 Bulgaria	0,163
25 Poland	0,381	25 Portugal	0,278			25 Japan	0,159
26 Turkey	0,348	26 Bulgaria	0,269			26 Turkey	0,136
27 Greece	0,340	27 Turkey	0,254			27 Greece	0,126
28 Yugoslavia	0,325	28 Yugoslavia	0,229			28 Spain	0,117
29 Spain	0,315	29 Romania	0,209			29 Yugoslavia	0,111

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1950 (Post-World War II Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	USA	1,000	USA	1,000	USA	1,000	USA	1,000
2	Canada	0,762	Switzerland	0,973	New Zealand	0,885	Canada	0,664
3	Argentina	0,671	New Zealand	0,940	Canada	0,811	Argentina	0,563
4	New Zealand	0,670	Sweden	0,792	Sweden	0,764	New Zealand	0,534
5	Norway*	0,639	Canada	0,790	Norway	0,737	Switzerland	0,471
6	Sweden	0,638	Australia	0,786	Australia	0,713	Sweden	0,463
7	Switzerland	0,636	Denmark	0,758	Switzerland	0,610	Belgium	0,408
8	UK*	0,616	UK	0,718	UK	0,603	Denmark	0,382
9	Denmark*	0,610	Netherlands	0,655	Denmark	0,570	UK	0,378
10	France*	0,571	Argentina	0,616	Belgium	0,521	Norway	0,367
11	Australia	0,566	Belgium	0,602	France	0,507	Australia	0,365
12	Belgium*	0,552	France	0,567	Finland	0,458	France	0,364
13	Finland	0,527	Norway	0,540	Netherlands	0,455	Finland	0,307
14	Netherlands*	0,512	Germany	0,476	Germany	0,415	Germany	0,267
15	Germany*	0,441	Finland	0,455	Ireland	0,332	Netherlands	0,264
16	Austria	0,430	Austria	0,401	Austria	0,322	Austria	0,196
17	Ireland	0,418	Italy	0,384	Italy	0,263	Ireland	0,196
18	Italy*	0,352	Ireland	0,375	Greece	0,199	Italy	0,186
19	Portugal	0,322	Spain	0,252	Japan	0,182	Spain	0,120
20	Spain	0,321	Greece	0,218	Portugal	0,171	Greece	0,119
21	Greece	0,316	Portugal	0,211	Spain	0,164	Portugal	0,108
22	Turkey	0,293	Japan	0,205			Turkey	0,094
23	Japan	0,255	Turkey	0,148			Japan	0,069

* Computed with Gilbert and Kravis's Paasche PPPs.

Relative GDP per Head in 1960 (Post-World War II Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	USA	1,000	Switzerland	1,144	USA	1,000	USA	1,000
2	Canada	0,820	USA	1,000	Canada	0,865	Canada	0,786
3	Sweden	0,751	New Zealand	0,898	Sweden	0,800	Sweden	0,653
4	Australia	0,705	Sweden	0,850	Norway	0,734	Australia	0,578
5	Switzerland	0,690	Denmark	0,822	New Zealand	0,688	Switzerland	0,555
6	New Zealand	0,686	Canada	0,812	Australia	0,678	New Zealand	0,553
7	UK	0,651	Germany	0,805	Switzerland	0,651	UK	0,480
8	France	0,640	Australia	0,795	Germany	0,629	France	0,464
9	Germany	0,639	Netherlands	0,775	UK	0,596	Germany	0,456
10	Norway	0,618	UK	0,773	France	0,590	Denmark	0,453
11	Denmark	0,617	France	0,694	Denmark	0,583	Norway	0,450
12	Finland	0,591	Belgium	0,653	Finland	0,531	Belgium	0,424
13	Belgium	0,588	Argentina	0,621	Belgium	0,524	Finland	0,397
14	Netherlands	0,547	Norway	0,608	Netherlands	0,501	Netherlands	0,363
15	Austria	0,525	Austria	0,604	Austria	0,435	Austria	0,310
16	Italy	0,498	Finland	0,570	Italy	0,346	Italy	0,274
17	Argentina	0,478	Italy	0,555	Ireland	0,325	Argentina	0,264
18	Ireland	0,450	Ireland	0,397	Japan	0,302	Ireland	0,232
19	Japan	0,389	Japan	0,364	Greece	0,254	Japan	0,165
20	Greece	0,370	Spain	0,318	Spain	0,187	Greece	0,147
21	Portugal	0,336	Greece	0,307	Portugal	0,182	Spain	0,121
22	Spain	0,330	Portugal	0,267			Portugal	0,119
23	Turkey	0,252	Turkey	0,175			Turkey	0,069

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1970 (Post-World War II Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	USA	1,000	1 Switzerland	1,169	1 USA	1,000	1 USA	1,000
2	Sweden	0,915	2 USA	1,000	2 Sweden	0,886	2 Sweden	0,837
3	Canada	0,907	3 Sweden	0,940	3 Norway	0,858	3 Canada	0,802
4	Switzerland	0,816	4 Denmark	0,892	4 Canada	0,840	4 Switzerland	0,665
5	Denmark	0,793	5 Germany	0,856	5 France	0,726	5 Denmark	0,643
6	Australia	0,793	6 Canada	0,844	6 Germany	0,721	6 Australia	0,632
7	Netherlands*	0,780	7 Netherlands	0,843	7 Australia	0,715	7 Germany	0,611
8	Germany*	0,771	8 Australia	0,817	8 Denmark	0,679	8 Norway	0,579
9	France*	0,760	9 France	0,811	9 Switzerland	0,677	9 France	0,565
10	Norway	0,754	10 New Zealand	0,804	10 Finland	0,666	10 Netherlands	0,528
11	Belgium*	0,734	11 UK	0,766	11 New Zealand	0,657	11 Belgium	0,525
12	Finland	0,694	12 Belgium	0,756	12 Belgium	0,630	12 Finland	0,476
13	UK*	0,689	13 Italy	0,686	13 Japan	0,584	13 New Zealand	0,467
14	New Zealand	0,686	14 Austria	0,681	14 Netherlands	0,584	14 UK	0,448
15	Austria	0,635	15 Japan	0,668	15 UK	0,571	15 Italy	0,401
16	Italy*	0,616	16 Finland	0,663	16 Austria	0,509	16 Japan	0,392
17	Japan*	0,611	17 Norway	0,638	17 Italy	0,427	17 Austria	0,389
18	Ireland	0,512	18 Argentina	0,614	18 Greece	0,395	18 Ireland	0,270
19	Argentina	0,492	19 Spain	0,468	19 Ireland	0,366	19 Argentina	0,263
20	Greece	0,485	20 Greece	0,456	20 Spain	0,271	20 Greece	0,228
21	Spain	0,470	21 Ireland	0,430	21 Portugal	0,262	21 Spain	0,210
22	Portugal	0,426	22 Portugal	0,353			22 Portugal	0,164
23	Turkey	0,236	23 Turkey	0,179			23 Turkey	0,056

* Computed with ICP II Paasche PPPs.

Relative GDP per Head in 1975 (Post-World War II Borders)

	Prados de la Escosura		Maddison(R)		Bairoch		Exchange Rate	
1	Sweden	1,011	1 Switzerland	1,094	1 USA	1,000	1 Sweden	1,210
2	USA	1,000	2 USA	1,000	2 Norway	0,861	2 Switzerland	1,153
3	Switzerland	0,989	3 Sweden	0,998	3 Sweden	0,840	3 Denmark	1,012
4	Canada	0,920	4 Canada	0,945	4 France	0,746	4 Canada	1,011
5	Norway	0,902	5 Denmark	0,885	5 Germany	0,708	5 USA	1,000
6	France*	0,883	6 Belgium	0,882	6 Finland	0,689	6 Australia	0,982
7	Australia	0,867	7 France	0,878	7 Denmark	0,669	7 Norway	0,966
8	Germany*	0,856	8 Netherlands	0,871	8 Switzerland	0,655	8 Germany	0,918
9	Denmark*	0,846	9 Germany	0,865	9 Belgium	0,654	9 Netherlands	0,888
10	Finland	0,828	10 New Zealand	0,836	10 Netherlands	0,575	10 France	0,884
11	Netherlands*	0,814	11 Australia	0,823	11 UK	0,562	11 Belgium	0,858
12	Belgium*	0,801	12 UK	0,774	12 Austria	0,534	12 Finland	0,808
13	Austria*	0,741	13 Austria	0,752	13 Greece	0,436	13 Austria	0,676
14	Japan*	0,736	14 Finland	0,731	14 Italy	0,417	14 New Zealand	0,619
15	UK*	0,733	15 Norway	0,717	15 Ireland	0,363	15 Japan	0,608
16	New Zealand	0,723	16 Japan	0,717	16 Portugal	0,307	16 UK	0,573
17	Italy*	0,660	17 Italy	0,705	17 Spain	0,290	17 Italy	0,521
18	Spain*	0,593	18 Argentina	0,633			18 Spain	0,394
19	Greece	0,527	19 Spain	0,567			19 Ireland	0,353
20	Portugal	0,480	20 Greece	0,525			20 Greece	0,315
21	Ireland*	0,469	21 Ireland	0,453			21 Argentina	0,277
22	Argentina	0,440	22 Portugal	0,395			22 Portugal	0,264
23	Turkey	0,304	23 Turkey	0,209			23 Turkey	0,116

* Computed with ICP III Paasche PPPs.

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1980 (Post-World War II Borders)

	Prados de la Escosura		Maddison(R)		Exchange Rate	
1	Switzerland	1,059	1 Switzerland	1,056	1 Switzerland	1,345
2	USA	1,000	2 USA	1,000	2 Sweden	1,257
3	Norway*	0,994	3 Canada	0,951	3 Norway	1,181
4	Canada*	0,976	4 Germany	0,896	4 Germany	1,100
5	Sweden	0,943	5 France	0,889	5 Denmark	1,083
6	France*	0,866	6 Sweden	0,888	6 France	1,032
7	Germany*	0,858	7 Denmark	0,870	7 Netherlands	1,026
8	Denmark*	0,852	8 Netherlands	0,841	8 Belgium	1,003
9	Netherlands*	0,832	9 Belgium	0,827	9 USA	1,000
10	Belgium*	0,831	10 Australia	0,788	10 Canada	0,922
11	Finland	0,821	11 Norway	0,783	11 Australia	0,909
12	Italy*	0,803	12 Austria	0,783	12 Finland	0,896
13	Japan*	0,785	13 Italy	0,768	13 Austria	0,852
14	Australia	0,780	14 Japan	0,753	14 UK	0,803
15	UK*	0,766	15 UK	0,744	15 Japan	0,758
16	Austria*	0,755	16 Finland	0,727	16 Italy	0,671
17	New Zealand	0,653	17 New Zealand	0,725	17 Argentina	0,622
18	Spain*	0,577	18 Argentina	0,564	18 New Zealand	0,601
19	Argentina*	0,552	19 Spain	0,548	19 Ireland	0,473
20	Ireland*	0,533	20 Greece	0,536	20 Spain	0,473
21	Portugal*	0,468	21 Ireland	0,462	21 Greece	0,348
22	Greece*	0,446	22 Portugal	0,434	22 Portugal	0,248
23	Turkey	0,223	23 Turkey	0,191	23 Turkey	0,090

* Computed with ICP IV Paasche PPPs.

Relative GDP per Head in 1985 (Post-World War II Borders)

	Prados de la Escosura		Maddison(R)		Exchange Rate	
1	USA	1,000	1 Switzerland	1,008	1 USA	1,000
2	Canada*	0,925	2 USA	1,000	2 Switzerland	0,854
3	Norway*	0,869	3 Canada	0,931	3 Norway	0,835
4	Switzerland	0,856	4 Denmark	0,905	4 Canada	0,819
5	Sweden*	0,816	5 Sweden	0,878	5 Sweden	0,718
6	Japan*	0,783	6 Germany	0,872	6 Denmark	0,676
7	Australia*	0,783	7 France	0,846	7 Japan	0,661
8	Denmark*	0,782	8 Norway	0,828	8 Finland	0,649
9	France*	0,752	9 Japan	0,798	9 Australia	0,633
10	Germany*	0,750	10 Netherlands	0,786	10 Germany	0,605
11	Netherlands*	0,722	11 Belgium	0,783	11 France	0,565
12	Finland*	0,708	12 Australia	0,780	12 Netherlands	0,531
13	Italy*	0,706	13 Austria	0,760	13 Austria	0,514
14	UK*	0,703	14 UK	0,743	14 Belgium	0,482
15	Belgium*	0,686	15 Finland	0,743	15 UK	0,481
16	Austria*	0,678	16 Italy	0,741	16 Italy	0,443
17	New Zealand*	0,642	17 New Zealand	0,737	17 New Zealand	0,399
18	Spain*	0,499	18 Spain	0,520	18 Ireland	0,315
19	Ireland*	0,421	19 Greece	0,506	19 Spain	0,254
20	Greece*	0,419	20 Ireland	0,447	20 Greece	0,201
21	Portugal*	0,414	21 Argentina	0,431	21 Argentina	0,182
22	Argentina	0,358	22 Portugal	0,424	22 Portugal	0,142
23	Turkey*	0,302	23 Turkey	0,194	23 Turkey	0,080

* Computed with ICP V Paasche PPPs.

Table 6. Relative GDP per Head: Alternative Estimates
[USA = 1]

Relative GDP per Head in 1990 (Post-World War II Borders)

Prados de la Escosura		Maddison(R)		Exchange Rate	
1 Switzerland*	1,025	**1** Switzerland	1,032	**1** Switzerland	1,530
2 USA	1,000	**2** USA	1,000	**2** Finland	1,241
3 Canada*	0,939	**3** Canada	0,932	**3** Sweden	1,233
4 Germany*	0,911	**4** Germany	0,910	**4** Denmark	1,157
5 Japan*	0,900	**5** Denmark	0,891	**5** Norway	1,146
6 Denmark*	0,893	**6** Japan	0,890	**6** Japan	1,097
7 France*	0,890	**7** France	0,881	**7** Germany	1,086
8 Sweden*	0,878	**8** Sweden	0,874	**8** USA	1,000
9 Belgium*	0,843	**9** Belgium	0,829	**9** Canada	0,986
10 Netherlands*	0,819	**10** Netherlands	0,813	**10** France	0,972
11 Norway*	0,809	**11** Norway	0,803	**11** Austria	0,943
12 Italy*	0,808	**12** Austria	0,791	**12** Belgium	0,898
13 Austria*	0,795	**13** Finland	0,791	**13** Netherlands	0,874
14 Finland*	0,794	**14** UK	0,787	**14** Italy	0,871
15 UK*	0,793	**15** Australia	0,783	**15** Australia	0,797
16 Australia*	0,787	**16** Italy	0,782	**16** UK	0,783
17 New Zealand*	0,659	**17** New Zealand	0,678	**17** New Zealand	0,578
18 Spain*	0,578	**18** Spain	0,584	**18** Spain	0,571
19 Portugal*	0,528	**19** Portugal	0,526	**19** Ireland	0,560
20 Ireland*	0,502	**20** Ireland	0,520	**20** Portugal	0,316
21 Greece*	0,395	**21** Greece	0,492	**21** Greece	0,302
22 Argentina	0,322	**22** Argentina	0,376	**22** Argentina	0,204
23 Turkey*	0,297	**23** Turkey	0,213	**23** Turkey	0,123

* Computed with ICP VI Paasche PPPs.

Sources: Appendix, Table A.1

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1820: Alternative Estimates

	GDP per Head [USA=1]				Price Levels [USA=1]		
	[I]	[II]	[III]	[IV]	[V]	[VI]	[VII]
	Exchange Rate	Maddison(R)	Prados de la Escosura		Maddison(R)	Prados de la Escosura	
			(I)	(II)		(I)	(II)
Australia	1,293	1,316	1,030	1,010	0,983	1,255	1,280
France	0,656	0,829	0,638	0,612	0,791	1,027	1,072
Netherlands	0,958	1,670	0,919	0,883	0,574	1,043	1,086
Sweden	0,751	0,740			1,014		
UK	1,166	1,483	0,965	0,918	0,787	1,209	1,270
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1830: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	1,998	0,889		1,255	1,205	2,248		1,592	1,659
Austria	0,435		1,253	0,504	0,493		0,347	0,862	0,882
France	0,881	0,733	0,831	0,681	0,649	1,202	1,061	1,294	1,358
Netherlands	0,929	0,964	1,424	0,855	0,820	0,964	0,652	1,086	1,133
Sweden	0,819	0,539	0,692	0,559	0,541	1,520	1,184	1,466	1,515
UK	1,337	0,961	1,448	0,977	0,927	1,391	0,923	1,369	1,443
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1840: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Austria	0,413		1,156	0,514	0,503		0,357	0,803	0,820
Belgium	0,918	0,850	1,194	0,794	0,766	1,080	0,769	1,156	1,198
France	0,828	0,744	0,885	0,700	0,668	1,113	0,935	1,183	1,240
Netherlands	0,853	0,941	1,369	0,858	0,835	0,906	0,623	0,994	1,022
Sweden	0,819	0,488	0,635	0,585	0,566	1,680	1,290	1,400	1,448
UK	1,134	0,970	1,396	0,933	0,892	1,168	0,812	1,215	1,272
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1850: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	1,452		1,903	1,088	1,054		0,763	1,335	1,378
Austria	0,416		1,119	0,511	0,500		0,371	0,813	0,831
Belgium	0,838	0,894	1,203	0,802	0,778	0,938	0,697	1,046	1,078
Canada	0,726		0,783	0,753	0,733		0,928	0,965	0,991
Denmark	0,617	0,557	1,097	0,714	0,700	1,109	0,563	0,864	0,882
France	0,792	0,724	0,865	0,715	0,684	1,093	0,915	1,108	1,158
Germany	0,444	0,670	0,853	0,567	0,555	0,662	0,520	0,783	0,799
Netherlands	0,781	0,928	1,372	0,815	0,799	0,841	0,569	0,959	0,977
Portugal	0,302	0,565	0,488	0,475	0,469	0,533	0,618	0,635	0,643
Spain	0,618	0,681	0,700	0,568	0,545	0,908	0,883	1,088	1,134
Sweden	0,417	0,459	0,631	0,517	0,506	0,908	0,661	0,806	0,824
UK	1,082	0,996	1,436	0,929	0,891	1,087	0,754	1,166	1,215
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1860: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	2,064	1,165	1,741	1,272	1,216	1,772	1,186	1,623	1,697
Austria	0,357		0,935	0,493	0,485		0,382	0,724	0,737
Belgium	0,998	0,885	1,232	0,870	0,841	1,128	0,810	1,147	1,187
Canada	0,765	0,749	0,679	0,760	0,737		1,127	1,007	1,037
Denmark	0,611	0,531	0,863	0,685	0,668	1,150	0,707	0,892	0,914
Finland	0,199	0,435	0,466	0,381	0,379	0,457	0,427	0,522	0,525
France	0,833	0,656	0,850	0,791	0,756	1,271	0,980	1,053	1,102
Germany	0,502	0,639	0,827	0,603	0,589	0,785	0,607	0,833	0,852
Greece	0,223	0,415	0,855	0,440	0,440	0,536	0,260	0,506	0,506
Italy	0,531	0,544	0,722	0,585	0,566	0,977	0,735	0,907	0,937
Netherlands	0,669	0,816	1,113	0,810	0,795	0,820	0,601	0,827	0,841
New Zealand	2,697		1,716	1,416	1,344		1,572	1,905	2,006
Portugal	0,319	0,497	0,376	0,493	0,486	0,643	0,850	0,648	0,657
Spain	0,619	0,625	0,638	0,568	0,545	0,991	0,971	1,091	1,136
Sweden	0,458	0,406	0,577	0,566	0,551	1,126	0,792	0,808	0,831
UK	1,070	1,008	1,368	0,952	0,915	1,061	0,782	1,123	1,169
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1870: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	1,395		1,630	1,087	1,052		0,856	1,283	1,326
Austria	0,365		0,954	0,561	0,557		0,383	0,651	0,656
Austria-Hungary	0,306	0,491		0,493	0,488	0,624		0,621	0,628
Belgium	0,995	0,919	1,444	0,910	0,889	1,082	0,689	1,093	1,119
Canada	0,619		0,687	0,740	0,727		0,901	0,836	0,852
Denmark	0,592	0,547	0,860	0,720	0,707	1,081	0,688	0,821	0,837
Finland	0,233	0,504	0,477	0,455	0,457	0,463	0,489	0,512	0,511
France	0,698	0,703	0,750	0,760	0,738	0,992	0,931	0,918	0,946
Germany	0,457	0,686	0,701	0,630	0,625	0,667	0,652	0,726	0,731
Greece	0,179	0,402	0,666	0,404	0,411	0,445	0,269	0,443	0,436
Hungary	0,200		0,396	0,419	0,420		0,505	0,478	0,477
Italy	0,441	0,502	0,647	0,600	0,586	0,878	0,681	0,735	0,752
Netherlands	0,586	0,815	1,115	0,670	0,680	0,720	0,526	0,874	0,861
New Zealand	1,850		1,548	1,217	1,187		1,195	1,519	1,558
Norway	0,493	0,678	0,541	0,657	0,647	0,728	0,911	0,750	0,762
Portugal	0,282	0,435	0,373	0,491	0,488	0,650	0,756	0,575	0,579
Spain	0,451	0,530	0,538	0,562	0,544	0,852	0,839	0,803	0,829
Sweden	0,377	0,396	0,577	0,577	0,570	0,952	0,653	0,653	0,662
UK	1,038	1,011	1,466	0,937	0,913	1,026	0,708	1,107	1,136
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1880: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	1,315		1,521	1,042	1,001		0,865	1,263	1,314
Austria	0,335		0,761	0,519	0,513		0,441	0,646	0,653
Austria-Hungary	0,275	0,390		0,466	0,462	0,705		0,590	0,596
Belgium	0,857	0,730	1,193	0,849	0,834	1,174	0,718	1,009	1,027
Canada	0,525		0,573	0,671	0,658		0,915	0,782	0,798
Denmark	0,518	0,491	0,724	0,676	0,664	1,057	0,716	0,767	0,780
Finland	0,198	0,405	0,374	0,424	0,428	0,490	0,531	0,468	0,463
France	0,588	0,575	0,660	0,705	0,687	1,022	0,890	0,833	0,855
Germany	0,424	0,549	0,697	0,604	0,593	0,773	0,609	0,703	0,716
Greece	0,187	0,322	0,664	0,410	0,413	0,581	0,282	0,456	0,453
Hungary	0,200		0,367	0,414	0,414		0,546	0,484	0,483
Italy	0,386	0,385	0,527	0,544	0,530	1,002	0,733	0,710	0,728
Japan	0,081		0,278	0,229	0,230		0,291	0,354	0,352
Netherlands	0,525	0,671	0,951	0,673	0,675	0,782	0,552	0,779	0,778
New Zealand	1,320		1,316	1,031	0,997		1,003	1,280	1,324
Norway	0,456	0,575	0,466	0,629	0,618	0,793	0,978	0,724	0,738
Portugal	0,256	0,334	0,307	0,458	0,455	0,766	0,834	1,280	0,563
Russia	0,136	0,277	0,298	0,319	0,318	0,492	0,458	0,428	0,429
Spain	0,488	0,400	0,575	0,577	0,558	1,219	0,849	0,846	0,875
Sweden	0,361	0,375	0,500	0,563	0,556	0,963	0,722	0,642	0,650
UK	0,872	0,842	1,227	0,866	0,842	1,036	0,711	1,007	1,036
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1890: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	1,476		1,482	1,102	1,053		0,996	1,339	1,403
Austria	0,363		0,782	0,544	0,537		0,465	0,668	0,676
Austria-Hungary	0,308	0,420		0,491	0,485	0,732		0,627	0,635
Belgium	0,825	0,734	1,175	0,835	0,823	1,125	0,702	0,989	1,003
Canada	0,694		0,689	0,766	0,743		1,007	0,906	0,934
Denmark	0,557	0,585	0,784	0,701	0,690	0,953	0,710	0,795	0,807
Finland	0,222	0,429	0,420	0,452	0,452	0,518	0,528	0,491	0,491
France	0,679	0,600	0,698	0,750	0,728	1,132	0,973	0,905	0,932
Germany	0,564	0,625	0,829	0,690	0,673	0,901	0,680	0,817	0,837
Greece	0,180	0,338	0,534	0,403	0,406	0,532	0,336	0,446	0,443
Hungary	0,259		0,449	0,464	0,461		0,577	0,558	0,561
Italy	0,379	0,362	0,521	0,535	0,522	1,048	0,729	0,709	0,727
Japan	0,104		0,298	0,281	0,281		0,348	0,369	0,369
Netherlands	0,545	0,682	1,002	0,666	0,672	0,799	0,544	0,819	0,812
New Zealand	1,124		1,210	0,966	0,942		0,929	1,164	1,193
Norway	0,490	0,609	0,492	0,658	0,649	0,804	0,995	0,744	0,755
Portugal	0,291	0,314	0,340	0,501	0,494	0,925	0,856	0,581	0,589
Russia	0,162	0,212	0,280	0,354	0,351	0,764	0,579	0,458	0,461
Spain	0,448	0,374	0,534	0,586	0,570	1,198	0,839	0,764	0,786
Sweden	0,398	0,415	0,531	0,598	0,592	0,959	0,749	0,665	0,672
Switzerland	0,601	0,821		0,708	0,709	0,733		0,850	0,848
UK	0,884	0,914	1,206	0,867	0,845	0,967	0,733	1,020	1,046
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1900: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Australia	0,993		1,121	0,919	0,894		0,886	1,080	1,111
Austria	0,341		0,733	0,531	0,526		0,464	0,641	0,648
Austria-Hungary	0,304	0,400		0,492	0,487	0,761		0,618	0,625
Belgium	0,744	0,696	1,031	0,792	0,785	1,068	0,722	0,939	0,947
Canada	0,724		0,720	0,789	0,769		1,006	0,918	0,941
Denmark	0,594	0,611	0,788	0,721	0,711	0,972	0,755	0,825	0,836
Finland	0,284	0,410	0,427	0,507	0,507	0,691	0,665	0,559	0,559
France	0,666	0,583	0,720	0,743	0,720	1,141	0,925	0,896	0,924
Germany	0,595	0,617	0,810	0,710	0,692	0,964	0,735	0,838	0,860
Greece	0,105	0,290	0,420	0,314	0,320	0,364	0,251	0,336	0,330
Hungary	0,251		0,437	0,456	0,453		0,575	0,551	0,554
Italy	0,341	0,323	0,468	0,521	0,511	1,055	0,729	0,654	0,668
Japan	0,111		0,307	0,310	0,311		0,362	0,360	0,358
Netherlands	0,508	0,593	0,906	0,641	0,649	0,858	0,561	0,793	0,783
New Zealand	1,060		1,147	0,940	0,921		0,924	1,128	1,151
Norway	0,546	0,557	0,453	0,691	0,679	0,980	1,206	0,791	0,804
Portugal	0,219	0,277	0,290	0,441	0,439	0,792	0,757	0,497	0,499
Russia	0,184	0,239	0,324	0,359	0,355	0,769	0,568	0,513	0,519
Spain	0,348	0,339	0,529	0,532	0,522	1,027	0,657	0,654	0,667
Sweden	0,497	0,438	0,575	0,659	0,648	1,133	0,864	0,753	0,766
Switzerland	0,567	0,758	0,920	0,689	0,691	0,749	0,617	0,823	0,821
UK	0,923	0,851	1,134	0,889	0,863	1,086	0,814	1,039	1,070
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1913: Alternative Estimates (Pre-World War I Borders)

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Argentina	0,695		1,086	0,759	0,747		0,640	0,915	0,930
Australia	1,063	0,754	1,125	0,943	0,912	1,410	0,945	1,127	1,165
Austria	0,352		0,704	0,536	0,530		0,500	0,657	0,665
Austria-Hungary	0,315	0,499		0,500	0,495	0,631		0,629	0,637
Belgium	0,588	0,655	0,966	0,686	0,693	0,897	0,608	0,856	0,848
Canada	0,971	0,835	0,865	0,878	0,854	1,163	1,123	1,106	1,137
Denmark	0,583	0,632	0,800	0,709	0,703	0,923	0,728	0,823	0,830
Finland	0,267	0,381	0,424	0,494	0,497	0,701	0,630	0,540	0,537
France	0,645	0,509	0,687	0,745	0,725	1,266	0,938	0,865	0,889
Germany	0,534	0,555	0,754	0,685	0,672	0,963	0,708	0,780	0,795
Greece	0,195	0,236	0,539	0,412	0,413	0,857	0,337	0,472	0,471
Hungary	0,261		0,424	0,460	0,457		0,617	0,568	0,572
Ireland	0,288	0,448	0,547	0,486	0,498	0,619	0,507	0,593	0,578
Italy	0,339	0,323	0,527	0,536	0,527	1,051	0,644	0,633	0,644
Japan	0,131	0,185	0,269	0,345	0,348	0,705	0,486	0,379	0,375
Netherlands	0,460	0,552	0,830	0,577	0,593	0,832	0,554	0,797	0,775
New Zealand	0,966	0,586	1,069	0,899	0,883	1,648	0,904	1,074	1,094
Norway	0,544	0,549	0,463	0,693	0,684	0,992	1,174	0,786	0,795
Portugal	0,200	0,214	0,239	0,415	0,415	0,935	0,836	0,483	0,482
Russia	0,173	0,239	0,300	0,358	0,356	0,722	0,574	0,481	0,485
Spain	0,332	0,269	0,442	0,523	0,514	1,233	0,751	0,634	0,646
Sweden	0,507	0,498	0,632	0,670	0,659	1,017	0,801	0,757	0,768
Switzerland	0,529	0,705	0,859	0,664	0,668	0,750	0,616	0,797	0,792
UK	0,715	0,707	0,991	0,805	0,789	1,012	0,722	0,888	0,907
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1913: Alternative Estimates (Post-World War I Borders)

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Argentina	0,695		1,086	0,759	0,747		0,640	0,915	0,930
Australia	1,063	0,754	1,125	0,943	0,912	1,410	0,945	1,127	1,165
Austria	0,474		0,704	0,628	0,618		0,674	0,756	0,768
Belgium	0,588	0,655	0,966	0,686	0,693	0,897	0,608	0,856	0,848
Bulgaria	0,220	0,193	0,302	0,397	0,394	1,140	0,726	0,553	0,557
Canada	0,971	0,835	0,865	0,878	0,854	1,163	1,123	1,106	1,137
Czechoslovakia	0,312	0,384	0,423	0,515	0,511	0,814	0,738	0,607	0,611
Denmark	0,583	0,632	0,800	0,709	0,703	0,923	0,728	0,823	0,830
Finland	0,267	0,381	0,424	0,494	0,497	0,701	0,630	0,540	0,537
France	0,645	0,509	0,687	0,745	0,725	1,266	0,938	0,865	0,889
Germany	0,534	0,555	0,754	0,685	0,672	0,963	0,708	0,780	0,795
Greece	0,202	0,236	0,539	0,415	0,416	0,857	0,375	0,486	0,486
Hungary	0,240	0,273	0,424	0,449	0,447	0,882	0,568	0,536	0,538
Ireland	0,277	0,448	0,547	0,477	0,490	0,619	0,507	0,581	0,566
Italy	0,339	0,323	0,527	0,536	0,527	1,051	0,644	0,633	0,644
Japan	0,131	0,185	0,269	0,345	0,348	0,705	0,486	0,379	0,375
Netherlands	0,460	0,552	0,830	0,577	0,593	0,832	0,554	0,797	0,775
New Zealand	0,966	0,586	1,069	0,899	0,883	1,648	0,904	1,074	1,094
Norway	0,544	0,549	0,463	0,693	0,684	0,992	1,174	0,786	0,795
Portugal	0,200	0,214	0,239	0,415	0,415	0,935	0,836	0,483	0,482
Romania	0,201			0,406	0,405			0,496	0,498
Spain	0,332	0,269	0,442	0,523	0,514	1,233	0,751	0,634	0,646
Sweden	0,507	0,498	0,632	0,670	0,659	1,017	0,801	0,757	0,768
Switzerland	0,529	0,705	0,859	0,664	0,668	0,750	0,616	0,797	0,792
Turkey	0,122		0,236	0,328	0,331		0,518	0,373	0,370
UK	0,739	0,730	0,991	0,818	0,801	1,013	0,746	0,904	0,923
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1929: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I]	[II]	[III]	[IV]	[V]	[VI]	[VII]	[VIII]	[IX]
	Exchange Rate	Bairoch	Maddison(R)	Prados de la Escosura (I)	Prados de la Escosura (II)	Bairoch	Maddison(R)	Prados de la Escosura (I)	Prados de la Escosura (II)
Argentina	0,469		0,800	0,642	0,636		0,586	0,730	0,737
Australia	0,760	0,542	0,807	0,804	0,784		0,942	0,946	0,970
Austria	0,301	0,402	0,583	0,518	0,520	0,749	0,517	0,582	0,579
Belgium	0,350	0,613	0,753	0,549	0,557	0,570	0,464	0,637	0,628
Bulgaria	0,089	0,171	0,185	0,287	0,292	0,519	0,480	0,309	0,303
Canada	0,748	0,712	0,793	0,801	0,785		0,944	0,935	0,953
Czechoslovakia	0,225	0,327	0,476	0,456	0,460	0,687	0,369	0,493	0,489
Denmark	0,520	0,528	0,805	0,673	0,671	0,985	0,646	0,773	0,775
Finland	0,230	0,330	0,423	0,457	0,463	0,697	0,543	0,503	0,497
France	0,391	0,549	0,738	0,591	0,585	0,713	0,530	0,662	0,669
Germany	0,389	0,430	0,619	0,586	0,579	0,904	0,627	0,664	0,671
Greece	0,100	0,218	0,383	0,292	0,303	0,461	0,262	0,344	0,332
Hungary	0,162	0,237	0,388	0,387	0,390	0,685	0,418	0,419	0,416
Ireland	0,315	0,370	0,448	0,525	0,532	0,852	0,704	0,600	0,593
Italy	0,251	0,289	0,493	0,468	0,464	0,871	0,510	0,538	0,542
Japan	0,149	0,221	0,282	0,374	0,378		0,527	0,398	0,394
Netherlands	0,395	0,563	0,905	0,578	0,586	0,702	0,437	0,683	0,675
New Zealand	0,668	0,587	0,843	0,756	0,751		0,792	0,884	0,890
Norway	0,490	0,577	0,499	0,658	0,652	0,849	0,982	0,744	0,751
Poland	0,121	0,196	0,331	0,330	0,333	0,621	0,366	0,367	0,365
Portugal	0,134	0,179	0,236	0,345	0,347	0,749	0,568	0,388	0,386
Romania	0,156	0,185	0,181	0,361	0,360	0,842	0,859	0,432	0,433
Spain	0,271	0,254	0,465	0,467	0,461	1,067	0,583	0,580	0,589
Sweden	0,476	0,501	0,666	0,653	0,646	0,950	0,715	0,729	0,737
Switzerland	0,566	0,707	0,989	0,709	0,702	0,801	0,573	0,798	0,806
Turkey	0,084		0,195	0,275	0,279		0,428	0,304	0,300
UK	0,594	0,580	0,784	0,724	0,714	1,024	0,757	0,820	0,832
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Yugoslavia	0,092	0,191	0,214	0,295	0,300	0,482	0,429	0,311	0,306

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1938: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I]	[II]	[III]	[IV]	[V]	[VI]	[VII]	[VIII]	[IX]
	Exchange Rate	Bairoch	Maddison(R)	Prados de la Escosura (I)	Prados de la Escosura (II)	Bairoch	Maddison(R)	Prados de la Escosura (I)	Prados de la Escosura (II)
Argentina	0,313		0,852	0,531	0,531		0,367	0,589	0,590
Australia	0,815		0,967	0,837	0,821		0,843	0,974	0,992
Austria	0,420	0,413	0,604	0,606	0,605	1,019	0,696	0,693	0,695
Belgium	0,507	0,654	0,803	0,648	0,654	0,774	0,631	0,781	0,774
Bulgaria	0,163	0,271	0,269	0,390	0,393	0,603	0,608	0,419	0,416
Canada	0,757		0,765	0,811	0,796		0,989	0,933	0,951
Czechoslovakia	0,296	0,353	0,486	0,519	0,520	0,839	0,482	0,571	0,570
Denmark	0,664	0,674	0,984	0,751	0,748	0,985	0,675	0,884	0,888
Finland	0,346	0,589	0,600	0,550	0,556	0,588	0,576	0,629	0,623
France	0,436	0,604	0,749	0,619	0,610	0,722	0,582	0,704	0,715
Germany	0,896	0,726	0,891	0,837	0,804	1,234	1,006	1,071	1,115
Greece	0,126	0,380	0,478	0,340	0,351	0,332	0,264	0,371	0,360
Hungary	0,195	0,291	0,447	0,420	0,420	0,670	0,436	0,464	0,464
Ireland	0,276	0,418	0,520	0,499	0,504	0,659	0,530	0,552	0,547
Italy	0,367	0,355	0,569	0,544	0,533	1,033	0,645	0,675	0,689
Japan	0,159		0,405	0,385	0,392		0,393	0,412	0,405
Netherlands	0,527	0,593	0,898	0,670	0,672	0,889	0,587	0,787	0,785
New Zealand	0,805		1,125	0,812	0,809		0,715	0,991	0,995
Norway	0,745	0,837	0,671	0,801	0,791	0,891	1,111	0,930	0,943
Poland	0,166	0,240	0,368	0,381	0,381	0,693	0,452	0,436	0,436
Portugal	0,174	0,226	0,278	0,400	0,401	0,769	0,626	0,436	0,434
Romania	0,220	0,221	0,209	0,419	0,417	0,993	1,049	0,524	0,526
Spain	0,117	0,217	0,330	0,315	0,317	0,536	0,353	0,370	0,368
Sweden	0,703	0,707	0,892		0,770	0,993	0,788	0,902	0,913
Switzerland	0,740	0,776	1,074		0,788	0,953	0,689	0,925	0,938
Turkey	0,136			0,2	0,352		0,536	0,391	0,387
UK	0,877	0,761		0,	0,847	1,152	0,914	1,010	1,035
USA	1,000	1,000		1,	1,000	1,000	1,000	1,000	1,000
Yugoslavia	0,111	0,219	0,2		0,331	0,510	0,486	0,343	0,337

Prados de la Escosura (I) and (II) computed [illegible] equations I and [illegible] dummies), and equations II and V (no dummies), respectively.

Relative GDP per Head and Price Levels in 1950: Alternative Estimates

	GDP per Head [USA=1]							Price Levels [USA=1]			
	[I] Exchange Rate	[II] Gilbert-Kravis*	[III] Bairoch	[IV] Maddison(R)	[V] Prados de la Escosura (I)	[VI] Prados de la Escosura (II)	[VII] Gilbert-Kravis*	[VIII] Bairoch	[IX] Maddison(R)	[X] Prados de la Escosura (I)	[XI] Prados de la Escosura (II)
Argentina	0,563			0,616	0,671	0,652			0,914	0,838	0,864
Australia	0,365		0,713	0,786	0,566	0,571		0,512	0,464	0,645	0,639
Austria	0,196		0,322	0,401	0,430	0,434		0,610	0,489	0,457	0,452
Belgium	0,408	0,552	0,521	0,602	0,591	0,597	0,740	0,784	0,678	0,691	0,684
Canada	0,664		0,811	0,790	0,762	0,752		0,819	0,840	0,872	0,883
Denmark	0,382	0,610	0,570	0,758	0,578	0,583	0,626	0,670	0,504	0,661	0,655
Finland	0,307		0,458	0,455	0,527	0,529		0,670	0,676	0,582	0,581
France	0,364	0,571	0,507	0,567	0,569	0,563	0,637	0,718	0,643	0,640	0,646
Germany	0,267	0,441	0,415	0,476	0,489	0,486	0,605	0,643	0,560	0,546	0,549
Greece	0,119		0,199	0,218	0,316	0,317		0,599	0,545	0,376	0,375
Ireland	0,196		0,332	0,375	0,418	0,430		0,591	0,523	0,470	0,457
Italy	0,186	0,352	0,263	0,384	0,408	0,408	0,527	0,705	0,484	0,455	0,455
Japan	0,069		0,182	0,205	0,255	0,261		0,378	0,335	0,270	0,264
Netherlands	0,264	0,512	0,455	0,655	0,467	0,481	0,516	0,580	0,403	0,565	0,549
New Zealand	0,534		0,885	0,940	0,670	0,671		0,604	0,569	0,798	0,796
Norway	0,367	0,639	0,737	0,540	0,565	0,570	0,575	0,498	0,681	0,651	0,645
Portugal	0,108		0,171	0,211	0,322	0,329		0,633	0,512	0,336	0,329
Spain	0,120		0,164	0,252	0,321	0,322		0,735	0,477	0,375	0,374
Sweden	0,463		0,764	0,792	0,638	0,637		0,606	0,585	0,726	0,727
Switzerland	0,471		0,610	0,973	0,636	0,638		0,772	0,484	0,741	0,738
Turkey	0,094			0,148	0,293	0,297			0,632	0,319	0,315
UK	0,378	0,616	0,603	0,718	0,577	0,578	0,613	0,626	0,526	0,655	0,653
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

* Computed with Gilbert and Kravis's Paasche PPPs.

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1960: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] Bairoch	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] Bairoch	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Argentina	0,264		0,621	0,478	0,473		0,425	0,552	0,558
Australia	0,578	0,678	0,795	0,705	0,693	0,852	0,726	0,820	0,834
Austria	0,310	0,435	0,604	0,525	0,529	0,711	0,513	0,590	0,585
Belgium	0,424	0,524	0,653	0,588	0,598	0,809	0,649	0,721	0,709
Canada	0,786	0,865	0,812	0,820	0,803	0,908	0,968	0,958	0,979
Denmark	0,453	0,583	0,822	0,617	0,623	0,776	0,551	0,733	0,727
Finland	0,397	0,531	0,570	0,591	0,593	0,747	0,696	0,671	0,669
France	0,464	0,590	0,694	0,640	0,630	0,787	0,669	0,725	0,737
Germany	0,456	0,629	0,805	0,639	0,634	0,725	0,566	0,714	0,720
Greece	0,147	0,254	0,307	0,370	0,376	0,578	0,479	0,396	0,391
Ireland	0,232	0,325	0,397	0,450	0,460	0,715	0,585	0,517	0,505
Italy	0,274	0,346	0,555	0,498	0,496	0,793	0,494	0,550	0,553
Japan	0,165	0,302	0,364	0,389	0,391	0,546	0,453	0,424	0,421
Netherlands	0,363	0,501	0,775	0,547	0,558	0,725	0,469	0,664	0,651
New Zealand	0,553	0,688	0,898	0,686	0,684	0,804	0,615	0,806	0,808
Norway	0,450	0,734	0,608	0,618	0,622	0,612	0,739	0,728	0,723
Portugal	0,119	0,182	0,267	0,336	0,343	0,656	0,447	0,355	0,348
Spain	0,121	0,187	0,318	0,330	0,332	0,649	0,381	0,367	0,366
Sweden	0,653	0,800	0,850	0,751	0,744	0,817	0,769	0,870	0,879
Switzerland	0,555	0,651	1,144	0,690	0,690	0,854	0,486	0,804	0,805
Turkey	0,069		0,175	0,252	0,257		0,393	0,274	0,269
UK	0,480	0,596	0,773	0,651	0,646	0,805	0,621	0,737	0,743
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1970: Alternative Estimates

	GDP per Head [USA=1]						Price Levels [USA=1]				
	[I] Exchange Rate	[II] ICP II*	[III] Bairoch	[IV] Maddison(R)	[V] Prados de la Escosura (I)	[VI] Prados de la Escosura (II)	[VII] ICP II*	[VIII] Bairoch	[IX] Maddison(R)	[X] Prados de la Escosura (I)	[XI] Prados de la Escosura (II)
Argentina	0,263			0,614	0,492	0,447			0,428	0,535	0,588
Australia	0,632		0,715	0,817	0,793	0,716		0,884	0,773	0,796	0,882
Austria	0,389		0,509	0,681	0,635	0,588		0,764	0,572	0,612	0,662
Belgium	0,525	0,734	0,630	0,756	0,704	0,659	0,716	0,834	0,695	0,747	0,797
Canada	0,802		0,840	0,844	0,907	0,820		0,955	0,951	0,885	0,979
Denmark	0,643		0,679	0,892	0,793	0,729		0,947	0,722	0,811	0,883
Finland	0,476		0,666	0,663	0,694	0,639		0,714	0,717	0,686	0,744
France	0,565	0,760	0,726	0,811	0,760	0,688	0,744	0,779	0,697	0,744	0,821
Germany	0,611	0,771	0,721	0,856	0,794	0,722	0,792	0,847	0,714	0,769	0,846
Greece	0,228		0,395	0,456	0,485	0,449		0,576	0,499	0,470	0,507
Ireland	0,270		0,366	0,430	0,512	0,484		0,737	0,628	0,527	0,558
Italy	0,401	0,616	0,427	0,686	0,649	0,592	0,651	0,939	0,585	0,618	0,678
Japan	0,392	0,611	0,584	0,668	0,631	0,572	0,642	0,671	0,588	0,621	0,685
Netherlands	0,528	0,780	0,584	0,843	0,709	0,661	0,677	0,905	0,627	0,745	0,800
New Zealand	0,467		0,657	0,804	0,686	0,630		0,711	0,581	0,680	0,741
Norway	0,579		0,858	0,638	0,754	0,696		0,675	0,907	0,768	0,832
Portugal	0,164		0,262	0,353	0,426	0,399		0,627	0,464	0,385	0,411
Spain	0,210		0,271	0,468	0,470	0,433		0,776	0,449	0,447	0,485
Sweden	0,837		0,886	0,940	0,915	0,830		0,945	0,890	0,914	1,008
Switzerland	0,665		0,677	1,169	0,816	0,749		0,981	0,568	0,815	0,887
Turkey	0,056			0,179	0,236	0,222			0,314	0,238	0,254
UK	0,448	0,671	0,571	0,766	0,689	0,630	0,667	0,785	0,585	0,650	0,711
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

* Computed with ICP II Paasche PPPs.

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1975: Alternative Estimates

	GDP per Head [USA=1]						Price Levels [USA=1]				
	[I] Exchange Rate	[II] ICP III*	[III] Bairoch	[IV] Maddison(R)	[V] Prados de la Escosura (I)	[VI] Prados de la Escosura (II)	[VII] ICP III*	[VIII] Bairoch	[IX] Maddison(R)	[X] Prados de la Escosura (I)	[XI] Prados de la Escosura (II)
Argentina	0,277			0,633	0,440	0,431			0,437	0,630	0,643
Australia	0,982			0,823	0,867	0,831			1,194	1,133	1,183
Austria	0,676	0,741	0,534	0,752	0,765	0,748	0,912	1,266	0,899	0,884	0,904
Belgium	0,858	0,801	0,654	0,882	0,845	0,837	1,071	1,312	0,973	1,015	1,024
Canada	1,011			0,945	0,920	0,889			1,069	1,099	1,137
Denmark	1,012	0,846	0,669	0,885	0,928	0,902	1,196	1,513	1,143	1,090	1,122
Finland	0,808		0,689	0,731	0,828	0,808		1,173	1,106	0,976	1,000
France	0,884	0,883	0,746	0,878	0,853	0,823	1,001	1,185	1,007	1,037	1,074
Germany	0,918	0,856	0,708	0,865	0,882	0,854	1,072	1,298	1,062	1,041	1,075
Greece	0,315		0,436	0,525	0,527	0,522		0,724	0,601	0,599	0,604
Ireland	0,353	0,469	0,363	0,453	0,558	0,562	0,753	0,974	0,781	0,633	0,629
Italy	0,521	0,660	0,417	0,705	0,669	0,654	0,789	1,249	0,739	0,779	0,796
Japan	0,608	0,736		0,717	0,694	0,672	0,826		0,848	0,876	0,904
Netherlands	0,888	0,814	0,575	0,871	0,870	0,857	1,091	1,545	1,020	1,020	1,036
New Zealand	0,619			0,836	0,723	0,707			0,740	0,855	0,875
Norway	0,966		0,861	0,717	0,902	0,882		1,122	1,347	1,070	1,096
Portugal	0,264		0,307	0,395	0,480	0,476		0,860	0,669	0,550	0,555
Spain	0,394	0,593	0,290	0,567	0,564	0,552	0,664	1,356	0,695	0,698	0,713
Sweden	1,210		0,840	0,998	1,011	0,977		1,441	1,213	1,198	1,239
Switzerland	1,153		0,655	1,094	0,989	0,957		1,760	1,054	1,166	1,205
Turkey	0,116			0,209	0,304	0,304			0,555	0,383	0,382
UK	0,573	0,733	0,562	0,774	0,706	0,692	0,782	1,018	0,740	0,811	0,828
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

* Computed with ICP III Paasche PPPs.

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1980: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] ICP IV*	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] ICP IV*	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Argentina	0,622	0,552	0,564	0,532	0,514	1,127	1,102	1,168	1,210
Australia	0,909		0,788	0,780	0,753		1,154	1,164	1,207
Austria	0,852	0,755	0,783	0,809	0,791	1,128	1,089	1,053	1,078
Belgium	1,003	0,831	0,827	0,831	0,827	1,206	1,212	1,207	1,212
Canada	0,922	0,976	0,951	0,867	0,840	0,945	0,970	1,063	1,098
Denmark	1,083	0,852	0,870	0,877	0,856	1,271	1,244	1,234	1,265
Finland	0,896		0,727	0,821	0,803		1,234	1,091	1,116
France	1,032	0,866	0,889	0,899	0,864	1,192	1,160	1,148	1,194
Germany	1,100	0,858	0,896	0,919	0,889	1,282	1,228	1,197	1,238
Greece	0,348	0,446	0,536	0,482	0,481	0,780	0,650	0,722	0,724
Ireland	0,473	0,533	0,462	0,499	0,512	0,888	1,025	0,948	0,923
Italy	0,671	0,803	0,768	0,785	0,758	0,836	0,873	0,855	0,886
Japan	0,758	0,785	0,753	0,741	0,715	0,966	1,006	1,023	1,061
Netherlands	1,026	0,832	0,841	0,920	0,901	1,233	1,220	1,115	1,139
New Zealand	0,601		0,725	0,653	0,645		0,828	0,920	0,932
Norway	1,181	0,994	0,783	1,044	1,004	1,188	1,509	1,132	1,177
Portugal	0,248	0,468	0,434	0,424	0,427	0,530	0,572	0,585	0,581
Spain	0,473	0,577	0,548	0,573	0,560	0,820	0,862	0,825	0,843
Sweden	1,257		0,888	0,943	0,915		1,416	1,333	1,373
Switzerland	1,345		1,056	1,059	1,022		1,274	1,271	1,316
Turkey	0,090		0,191	0,223	0,228		0,474	0,405	0,395
UK	0,803	0,766	0,744	0,842	0,812	1,048	1,078	0,953	0,988
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

* Computed with ICP IV Paasche PPPs.

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1985: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] ICP V*	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] ICP V*	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Argentina	0,182		0,431	0,358	0,353		0,423	0,510	0,516
Australia	0,633	0,783	0,780	0,719	0,697	0,809	0,811	0,881	0,909
Austria	0,514	0,678	0,760	0,674	0,666	0,758	0,676	0,762	0,772
Belgium	0,482	0,686	0,783	0,627	0,635	0,703	0,616	0,769	0,760
Canada	0,819	0,925	0,931	0,839	0,816	0,886	0,880	0,977	1,004
Denmark	0,676	0,782	0,905	0,769	0,756	0,865	0,747	0,879	0,895
Finland	0,649	0,708	0,743	0,752	0,737	0,916	0,874	0,863	0,881
France	0,565	0,752	0,846	0,697	0,682	0,751	0,668	0,810	0,829
Germany	0,605	0,750	0,872	0,727	0,715	0,806	0,693	0,831	0,846
Greece	0,201	0,419	0,506	0,431	0,432	0,479	0,397	0,466	0,465
Ireland	0,315	0,421	0,447	0,523	0,531	0,747	0,704	0,602	0,593
Italy	0,443	0,706	0,741	0,622	0,612	0,627	0,597	0,712	0,724
Japan	0,661	0,783	0,798	0,717	0,693	0,845	0,829	0,922	0,955
Netherlands	0,531	0,722	0,786	0,671	0,673	0,735	0,675	0,790	0,789
New Zealand	0,399	0,642	0,737	0,599	0,594	0,622	0,542	0,666	0,672
Norway	0,835	0,869	0,828	0,847	0,829	0,961	1,008	0,985	1,007
Portugal	0,142	0,414	0,424	0,366	0,372	0,342	0,335	0,388	0,382
Spain	0,254	0,499	0,520	0,472	0,468	0,508	0,488	0,538	0,542
Sweden	0,718	0,816	0,878	0,790	0,775	0,880	0,818	0,908	0,926
Switzerland	0,854		1,008	0,856	0,838		0,848	0,998	1,020
Turkey	0,080	0,302	0,194	0,270	0,274	0,264	0,412	0,296	0,291
UK	0,481	0,703	0,743	0,650	0,640	0,683	0,647	0,739	0,751
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

* Computed with ICP V Paasche PPPs.

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Appendix. Table A1. Relative GDP per Head and Price Levels, 1820-1990.

Relative GDP per Head and Price Levels in 1990: Alternative Estimates

	GDP per Head [USA=1]					Price Levels [USA=1]			
	[I] Exchange Rate	[II] ICP VI*	[III] Maddison(R)	[IV] Prados de la Escosura (I)	[V] Prados de la Escosura (II)	[VI] ICP VI*	[VII] Maddison(R)	[VIII] Prados de la Escosura (I)	[IX] Prados de la Escosura (II)
Argentina	0,204		0,376	0,322	0,350		0,541	0,632	0,582
Australia	0,797	0,787	0,783	0,713	0,756	1,012	1,018	1,117	1,053
Austria	0,943	0,795	0,791	0,813	0,871	1,187	1,192	1,160	1,083
Belgium	0,898	0,843	0,829	0,780	0,852	1,065	1,083	1,151	1,053
Canada	0,986	0,939	0,932	0,823	0,875	1,050	1,057	1,198	1,127
Denmark	1,157	0,893	0,891	0,893	0,950	1,295	1,299	1,295	1,218
Finland	1,241	0,794	0,791	0,914	0,966	1,562	1,570	1,358	1,285
France	0,972	0,890	0,881	0,808	0,858	1,093	1,103	1,203	1,134
Germany	1,086	0,911	0,910	0,865	0,921	1,192	1,193	1,256	1,180
Greece	0,302	0,395	0,492	0,469	0,512	0,763	0,613	0,644	0,590
Ireland	0,560	0,502	0,520	0,630	0,692	1,114	1,077	0,889	0,808
Italy	0,871	0,808	0,782	0,758	0,805	1,077	1,114	1,149	1,082
Japan	1,097	0,900	0,890	0,836	0,882	1,219	1,232	1,312	1,244
Netherlands	0,874	0,819	0,813	0,781	0,848	1,067	1,075	1,118	1,031
New Zealand	0,578	0,659	0,678	0,633	0,680	0,878	0,853	0,912	0,850
Norway	1,146	0,809	0,803	0,891	0,950	1,416	1,426	1,287	1,206
Portugal	0,316	0,528	0,526	0,484	0,532	0,598	0,600	0,652	0,594
Spain	0,571	0,578	0,584	0,615	0,658	0,988	0,977	0,928	0,867
Sweden	1,233	0,878	0,874	0,921	0,977	1,404	1,410	1,339	1,262
Switzerland	1,530	1,025	1,032	1,022	1,084	1,492	1,482	1,496	1,411
Turkey	0,123	0,297	0,213	0,293	0,323	0,413	0,578	0,420	0,380
UK	0,783	0,793	0,787	0,736	0,787	0,988	0,995	1,064	0,995
USA	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

* Computed with ICP VI Paasche PPPs.

Prados de la Escosura (I) and (II) computed with Table 2, equations I and IV (time dummies), and equations II and V (no dummies), respectively.

Notes and Sources to Table A.1.

Price Levels (PL) are defined as follows, PL=(NGDP/XR)/(NGDP/PPP)=PPP/XR, where NGDP is GDP expressed in national currency and PPP and XR are purchasing power parity and trading exchange rates. Price levels are computed for the relevant geographical definitions in each column.

Sources: Trading exchange rates, national sources up to 1913, such as Carreras (1989), Lains (1992), Lazaretou (1995), Mata and Valério (1994), Simon (1960), and, specially, cross-country quotations from Antio (1992), Posthumus (1946), Schneider and Schwarzer (1990), and Schneider, Schwarzer and Schelzer (1993). For 1913-1938, League of Nations' Yearbooks and US Statistical Abstract; IMF Yearbooks for 1950-1990. The column under Maddison (R), refers to GDP per head expressed in 1990 US $ (at US relative prices), computed from Maddison (1995) but revised with the latest GDP data available for each country as explained in the sources below in order to make it consistent with the new estiamtes. The column under Bairoch derives from Bairoch (1976, 1978, 1989), and refers to GDP per head in 1960 US$. New current price estimates of GDP per head (columns under Prados de la Escosura) are computed by converting product per head expressed in national currencies into US dollars with Paasche PPPs derived from equations (I-V) in Table 2 and, represent real income expressed in US relative prices (Laspeyres values). Nominal GDP estimates are (whenever possible) defined at market prices per head and come from the following national sources stated below or from Mitchell (1992, 1993, 1994)) or from OECD National Accounts and UN Yearbooks (for constant price GDP per head, Maddison (1995) provides the default data). Population figures used to derive per capita GDP, and data for trade (**OPEN**) and the balance of payments on current account (**CABAL**) used to derive the new estimates GDP per head with equations in Table 2 are taken mainly from League of Nations (1943), Mitchell (1992, 1993, 1994), and from the League of Nations, the UN, IMF and UNCTAD Yearbooks, unless stated in the national sources below.

Argentina. GDP, Cortés Conde (1997) for 1914 at current prices. **CABAL**, Della Paolera and Taylor (1997) for 1913.

Austria. GDP, data for Imperial (Habsburg) Austria is from Kausel (1979) for 1830-1860, and for 1870-1913 is from Schulze (1997), at 1913 prices, reflated with Kausel's implicit GDP deflator. Modern (Republic of) Austria's level for 1913 was derived by applying Good's (1994) ratio (1.346) to Schulze's Imperial estimates. **OPEN**, crude computations from data on the share of Imperial Austria in Austria-Hungary trade derived from Eddie (1980) for 1880-1913 and extended back to 1830.. Eddie (1980) provides Imperial Austria's share in Austria-Hungary trade and, therefore, trade by Imperial Austria can be derived, which includes re-exports to and from Hungary. Eddie presents shares of Austria in Hungary's trade, so Austrian trade with the rest of the World can easily be computed. A difficulty appears as regards the share of Austrian trade with Hungary that represents domestic exports and retained or net imports and not just re-exports. Given the lack of information, I decided to consider re-exports negligible and to attribute all the trade between Imperial Austria and Hungary to domestic exports and retained imports. The computed share of Austria in Austria-Hungary trade for 1880 was applied to trade figures for Dual Monarchy in earlier years in order to derive Austrian exports and imports back to 1830.

Belgium. GDP, Horlings (1997), 1830-1913; average of GDP estimates from Buyst (1997) (income and expenditure approaches) and Horlings (1997) (output), for 1925-1938.

Canada. GDP and **OPEN** Firestone (1960), 1850-1860. Urquhart (1986), 1870-1926. Although Urquhart seems to favour GNP, GDP was prefered to GNP here. **CABAL**, Urquhart (1986), 1870-1926.

Czechoslovakia. GDP, Clark (1957), NNP for 1913 and 1925, re-scaled by 5% to allow for the GNP/NNP differential. Krejci (1968), 1929-1937 at current prices. Given the missing figure, the level of GDP per head for 1938 has been considered identical to that for 1937.

France. GDP, Toutain (1997), 1830-1938. Toutain's recently revised figures are significantly higher than those in Lévy-Leboyer and Bourguignon (1985).

Finland. GDP, Hjerppe (1994), 1860-1950. **CABAL**, Bärlund (1992), 1890-1913, 1925-1938, Lappalainen (1997).

Germany. **GDP**, 1850-1890, Hoffmann (1965); 1900-1950, Spoerer (1997) and Ritschl (1991). 1850-1900 GNP at market prices was obtained by re-scalating NNP with the GNP/NNP ratio for 1901-13, from Spoerer (1997). GDP at market prices was computed from the GNP estimates and from data on net factor payments abroad taken from Hoffmann (1965) and Ritschl (1991). West Germany figures since 1950 include the Saar and West Berlin and figures for West Germany in 1950-55 had to be re-scaled by 8.6 per cent. The constant price data has been extended back to 1830 with Fremdling (1995) estimates. **OPEN**, Bondi (1958), 1850-1870; Hoffmann (1965), 1880-1955. **CABAL**, Hoffmann (1965), 1850-1913, 1950-55; Ritschl (1991), 1925-1938.
Greece. **GDP**, Kostelenos (1995), 1860-1938.
Hungary. **GDP**, data for 1870-1913 at 1913 prices from Schulze (1998) reflated with Kausel (1979) implicit GDP deflator (for Imperial Austria) to derive current price estimates for Imperial (Habsburg) Hungary. In turn, figures for Modern (Republic of) Hungary in the period 1913-1938 were taken from Eckstein (1955) for the country as defined by the treaty of Trianon (1919). Modern (Republic of) Hungary's level for 1913 could alternatively be derived by applying Good's (1994) ratio (1.24) to Schulze's (1997) Imperial estimates. However, the difference between the new estimate by Schulze and Eckstein's for Modern Hungary in 1913 is striking. Eckstein's figures for Trianon Hungary were 87.6% of Schulze's Imperial Hungary, but since Schulze's Imperial Hungary includes two poorer regions (modern Romania and Yugoslavia), even though Eckstein figures refer to NNP, Eckstein estimates should be higher. Eckstein's estimates represent only 70.7% of Modern Hungary per capita income derived by applying Good's (1994) ratio to the Imperial Hungary figures. I therefore decided to choose Eckstein's data and to reflate it by 5% to allow for GNP-NNP differences (a percentage taken from tha same ratio for Germany in 1950). **OPEN**, crude computations from data on the share of Imperial Hungary in Austria-Hungary trade derived from Eddie (1980) for 1880-1913 and extended to 1870. Eddie (1980) provides Imperial Austria's share in Austria-Hungary trade and, therefore, trade by Imperial Hungary can be derived, which includes re-exports to and from Austria. Eddie presents shares of Hungary in Austrian trade, so Hungarian trade with the rest of the World can easily be computed. A difficulty appears as regards the share of Hungarian trade with Austria that represents domestic exports and retained or net imports and not just re-exports. Given the lack of information, I decided to consider re-exports negligible and to attribute all the trade between Imperial Austria and Hungary to domestic exports and retained imports. The computed share of Hungary in Austria-Hungary trade for 1880 was applied to trade figures of the Dual Monarchy in order to derive exports and imports from Hungary in 1870.
Austria-Hungary. **GDP** computed for 1870-1913 by adding the corresponding figures for Imperial Austria and Hungary.
Ireland. **GDP**, All Ireland, estimate for 1913 by Ó Gráda (1994). For the Republic of Ireland, the 1913 value was computed by applying the Republic of Ireland/Ireland ratio in Kennedy (1995, Table 2) to Ó Gráda's (1994) estimates for all Ireland. O'Rourke's (1995) estimate for 1926 was accepted for 1925. Republic of Ireland, Kennedy (1971) for 1929-1965. **OPEN**, all Ireland for 1913, private communication by Kevin O'Rourke. 1926-1965, Kennedy (1971) for the Republic of Ireland.
Italy. **GDP**, current price estimates, Rossi, Sorgato & Toniolo (1993), 1890-1990. ISTAT figures for 1861-1890, re-scaled to match the 1890 level. It has been argued that Rossi et al. estimates might exaggerate late19th and mid-20th century levels (Ercolani (1993)).
Japan. **GDP**, **OPEN** and **CABAL**, Ohkawa and Shinohara (1979), 1885-1955. I accepted for 1880 the level of product per head for 1885. Although the authors seem to favour GNP, GDP was prefered to GNP.
Netherlands. **GDP**, **OPEN** and **CABAL** Smits, Horlings and van Zanden (1997), 1820-1913; den Bakker, Huitker and van Bochove (1990), 1925-1938. Smits et al. (1997) consider their expenditure series more reliable than the output or income ones but point out that the expenditure levels for 1913 are too low. An average of the three GDP estimates has then been considered here for 1820-1913.
New Zealand. **GDP and OPEN**, Rankin (1992), 1860-1938.
Portugal. **GDP**, For 1850-1900, Justino's (1987) indirect estimates provide a better alternative than Nunes, Mata and Valério (1989) and Valério (1998), whose figures seem implausible high (twice as much as Justino's and 1.8 times those by Batista et al. for 1913). for

1910-1950 I prefered Batista, Martins, Pinheiro and Reis (1997)'s estimates of GDP at current prices, re-scaled to match Pinheiro (1997) GDP level for 1953, to indirect estimates by Nunes, Mata and Valério (1989) and Valério (1998). For 1955-1990, Pinheiro (1997). **OPEN**, Lains (1995), for 1850-1913; Valério (1998), 1920-1938; Pinheiro (1997), 1955-1990. **CABAL**, Mata (1987), 1894-1931; Mata and Valério (1994), 1938 (figure for 1939); Pinheiro (1997), 1950-1990.

Romania. **GDP**, 1925-1938, Lethbridge (1985).

Russia. GDP and **CABAL**, Imperial Russia, Gregory (1982), 1885-1913. As in the case of Japan, I accepted for 1880 the level of product per head for 1885. Original NNP figures were converted, first, into NDP by deducting net payments to foreign factors and, then, re-scaled by 5% to allow for the GDP/NDP differential.

Spain. **GDP**, **OPEN** and **CABAL**, Prados de la Escosura (1998), 1850-1990.

Sweden. **GDP**, Krantz (1997), 1820-1950.

Turkey. **GDP** and **OPEN**, 1913-1938, Private communications by Sevket Pamuk which derive from Ozel (1997), and Pamuk (1998).

United Kingdom. **GDP**, Mitchell (1988) publishes revised estimates by Feinstein that updates his earlier work (Feinstein (1972)) and it is linked to Deane (1968) figures for 1830-1850 in order to provide consistent figures of GDP at market prices. An estimate for 1820 was derived by applying a ratio of Mitchell (1988) to Deane and Cole (1967) GDP estimates for 1831 to Deane and Cole's figure at current prices for 1821. Corresponding values for post-1921 UK in the year 1913 were computed by substracting estimates for the Republic of Ireland (see above) from Feinstein's figures for pre-1921 UK (Great Britain and Ireland). **OPEN** and **CABAL**, Mitchell (1988).

USA. **GDP**, Balke and Gordon (1989), 1870-1929. 1820-1860,Weiss (1994), "conventional estimate" at constant prices reflated with Berry (1968) implicit GDP deflator (in Mitchell (1993)).. GDP was computed by deducting net payments to foreign factors from GNP figures. **OPEN** and **CABAL**, North (1960), 1820-1860; Simon (1960), 1870-1900.